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SE AND THROAT WORK
FOR THE
ENERAL PRACTITIONER

BY

G. L. RICHARDS M. D.

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NOSE AND THROAT WORK

FOR THE

GENERAL PRACTITIONER

BY

GEORGE L. RICHARDS, M. D.

FELLOW AMERICAN LARYNGOLOGICAL, RHINOLOGICAL AND OTOLOGICAL SOCIETY;
FELLOW AMERICAN OTOLOGICAL SOCIETY;
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FALL RIVER, MASS.

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PREFACE.

I have endeavored in this book to describe the symptoms and treatment of the more common affections of the nose and throat in clear, concise language and in such detail that the reader can follow the directions given. It is intended as a working guide for the practitioner and student with little experience in the treatment of these affections and as an introduction to the more complete treatises. While based principally on my own experience, it is hoped that it will be found exponential of the present day practice in diseases of the nose and throat.

GEO. L. RICHARDS.

September 15, 1903.

82293

To my Colleagues of the American Laryngological, Rhinological and Otological Society, this book, which owes whatever of merit it may have to the healthy stimulus of the Society, is inscribed.

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INTRODUCTION.

Affections of the chest, both of the lungs and their investing pleuræ, have occupied the minds of, and been closely studied by medical men for many generations. The same is also true to a lesser degree of that portion of the throat which is readily visible. With the advent of the laryngoscope came opportunities for the better examination of the larynx, and an added impetus was given to the study and treatment of these affections. It is only, however, within comparatively recent years that that portion of the upper air tract known as the nose and naso-pharynx has been extensively studied, its importance to the rest of the bodily economy recognized, the diseases to which it is liable specially considered, and means perfected for their relief.

Thirty-five years ago Wilhelm Meyer performed the first operation for the removal of adenoid growths, published his observations to the world, and opened up a new field of research. Even as late as 1881, the discussion of this subject was somewhat of a novelty at the International Medical Congress in London. Until comparatively recently no distinct teaching on the subject of the diseases of the nose and throat has been given in our medical schools, and there is many a physician in active practice who was not taught in his medical school or hospital days, either the methods of examination or treatment of the diseases of the nose and throat. For such as have not had such opportunities in their student days, and have since been too busy with other things to give much time to the subject, and yet who feel in their daily work the need of more information, the present book has been planned. An endeavor will be made to present the subject in such a manner as to awaken the interest of the reader, and lead him, should he so desire, to pursue his investigations farther; at least to describe the more common affections and their treatment in so practical a way as to render the book of actual value.

Our changeable climate, especially on the Atlantic seaboard and the region of the great lakes, with its rapid alternations of temperature, its great and varying humidity, is very productive of affections of the upper air tract. From the day the child is born until he departs from the world he is subject to constant variations of temperature and moisture. The dweller in the city suffers also from the evil influences of dust and wind. The dust enters the nose, the pharynx and the larynx, and is a constant irritant, productive of much discomfort. While nature intended to provide for variations in temperature and moisture, and does so to a great extent, yet sooner or later nearly every person suffers from some discomfort in this region. A mild, equable climate, neither too moist or too dry, is the one most desirable; an excessively dry climate is productive of almost as much discomfort, at least so far as the nose is concerned, as one too moist.

The beginnings of many of the diseases of the upper air tract are in very earliest childhood. Repeated colds, improperly cared for, not rated at their true significance; difficulties in breathing; mouth breathing considered a habit rather than a pathological condition, become productive as age advances of what is known as chronic catarrh, for which the advertising columns of the newspapers proclaim innumerable panaceas. Hence it becomes necessary for the family physician who would do the best for his patient to be a specialist in this, as he must needs be in every department of medicine. He should be able to make the ordinary examinations, to treat the simpler affections, and to know when his patient ought to be sent to a physician, who, devoting his whole time to this specialty, is necessarily of wider experience, and more capable of caring for those cases which require exceptional skill in diagnosis and treatment.

The author will endeavor to present the subject as clearly as possible, with an absence of unnecessary detail, and yet with sufficient minuteness in the description of special procedures for the physician to feel confidence in following his directions.

Most of the procedures come under the head of surgery rather than of medicine, although here, as elsewhere, there can be no closely drawn line between the one field and the other.

The author lays no claim to special originality. He has made use of all of the standard works on the subject to which he has had access, both English and foreign, but he has not considered it necessary to take up the space to acknowledge his obligations in every instance: Public medical writings are the property of the profession, and as such are to be used for the common good. In the main, however, those methods of diagnosis and treatment will be described in detail which the author has personally found to be of service, since he believes that one method thoroughly described is better than four or five vaguely mentioned.

Neither a text-book completeness nor a text-book style is aimed at, nor will mooted points be discussed. Methods and ways will be given which have been found by the author useful and practical; and the omission of any procedure does not imply that it is not perhaps quite as good as those given. The rare affections will either not be considered, or only slightly mentioned, as the aim is to describe and teach the ways of doing those surgical procedures of the nose and throat which are likely to come within the province of every practitioner.

ANATOMY.

CHAPTER I.

ANATOMY.

Since it is absolutely impossible to make an accurate diagnosis of conditions in the nose and throat, or do any surgery therein, without a good working knowledge of their anatomy, that subject will be first considered, but only so much of it will be given as the writer regards as absolutely necessary. Detailed descriptions of the gross and fine anatomy can be found in the systematic works on anatomy, and in the larger treatises on the nose and throat.

The external nose is formed of the nasal process of the upper jaw and the nasal bones; the latter articulating on their upper margins with the frontal bone, and prolonged downwards as fibro-cartilaginous plates forming the outer wall. In the middle line the cartilaginous septum is prolonged upward from the nasal process of the upper jaw. Attached to the cartilages of the outer wall are the muscles of the entrance to the nose, the elevators and depressors of the alæ. The skin covering the cartilage is reflected inward, forming the vestibule, and has at this point vibrissæ with deep hair-bulbs, fat, and sweat-glands. These not infrequently give rise to acne and furuncles.

The septum, the division line of the nose, is made up of three parts—the quadrilateral cartilage, under normal conditions cartilaginous throughout life; the bony vomer, and the perpendicular plate of the ethmoid. (See Fig. 1.) Above, the septum reaches to the cribriform plate of the ethmoid; below, it articulates with the upper jaw. A probe can be passed up to the cribriform plate, the location of which it is important to bear in mind in operations, on account of its close relationship to the brain.

Passing outward from the upper end of the septum, the lateral mass or body of the ethmoid bone and its cells are found. On this, and a part of it, is formed the superior turbinate bone, which is never visible from in front, but may be seen from behind on rhinoscopic examination. Underneath the superior turbinate, and reaching far forward, still a part of the ethmoid, is the middle turbinate bone, which is visible from in front and behind. Underneath the middle turbinate is the inferior turbinate, longer than the others, and reaching from near the entrance of the nose, and a little beyond the floor of the posterior choanæ. It is a separate bone, attached to the upper jaw, and lying over the opening into the antrum of Highmore.

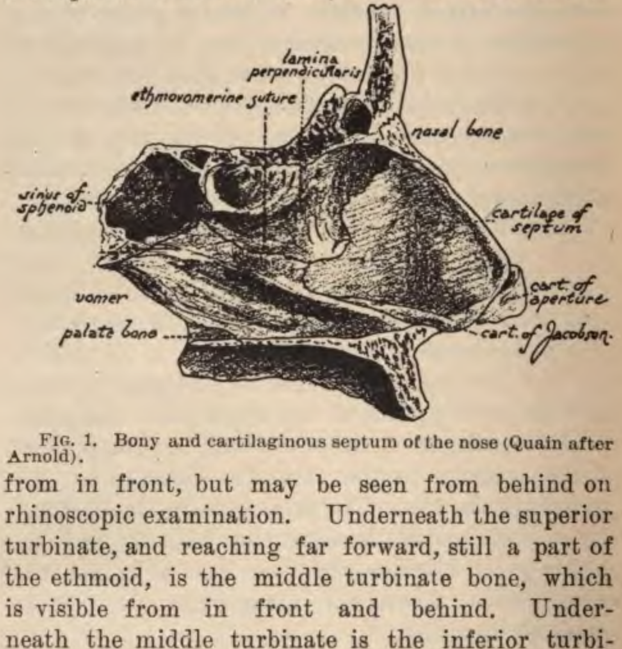

FIG. 1. Bony and cartilaginous septum of the nose (Quain after Arnold).

All of the turbinate bones have their free surfaces convex and presenting towards the septum. (See Fig. 10.) The space between the inferior turbinate and the floor of the nose is called the inferior meatus; that between the inferior and middle turbinates, the middle meatus; and that above the middle turbinate, the superior meatus. The ethmoid bone is of spongy texture, with many cells, which have no regular outlets, but open by depressions in the wall directly into the middle and superior meatuses, and are commonly divided into the anterior and posterior ethmoid cells, the anterior opening into the front of the nose, in the superior and middle meatuses, and the posterior into the naso-pharynx. These cells are liable to many pathological conditions. On the outer side, the ethmoid cells reach to the orbital cavity, and the eyeball can be displaced by disease in these cells. (See Fig. 2.)

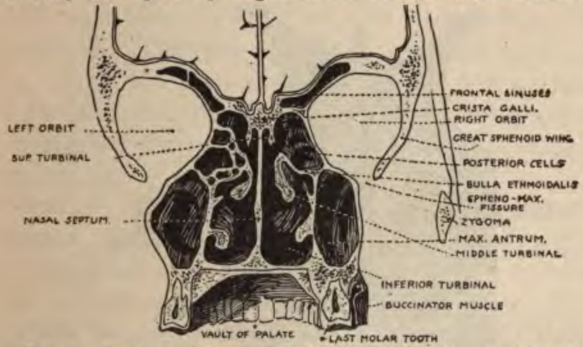

FIG. 2 Section of the nasal fossæ, looking from behind forward (Quain after Testut).

The roof of the nose is formed by the under surface of the nasal bone, the ethmoid portion of the frontal, the cribriform plate, and a portion of the body of the sphenoid. The floor of the nose inclines slightly downwards from before backwards, and is formed by the superior maxillary and palate bones. The middle turbinate varies greatly both in size and shape. As a rule, it answers in position to the lower limit of the perpendicular plate of the ethmoid, where it joins the vomer. It inclines downward and backward to a greater degree than the inferior turbinate, and its front end has a shiny, bulb-like appearance. The inferior turbinate presents in the living subject a rounded, sometimes almost cherry-shaped, mass when looked at from in front. Frequently it or its covering closely approximates the septum, and there may be actually false union or synechia. This union may be due to either the position of the septum or of the turbinate. Posteriorly the bone is less convex.

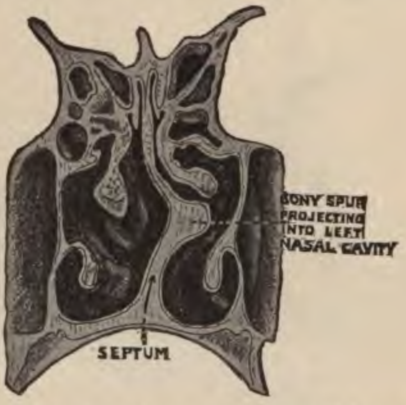

FIG. 3. Section of anterior portion of nose with large bony spur of the septum. The opposing inferior turbinate is not as well developed as the one on the other side (Zuckerkandl).

Asymmetry of the nasal chambers is quite common, and is regarded by Harrison Allen as generally acquired, but occurs often as the result of injury in childhood, and may be due to errors in growth and development. The left air chamber is commonly the smaller, and the septum is seldom in the exact median line in the anterior half; posteriorly the vomer is always in the median line. Answering to the place of union between the perpendicular plate of the ethmoid and the vomer, an irregular ridge can often be felt with the finger. (See Fig. 3.) It may be a spur of sufficient size to interfere with breathing. The anterior nasal chamber is called the nostril, the posterior, the choana. The opening of the tear duct lies underneath the anterior end of the inferior turbinate, about one quarter of an inch backwards.

Opening into each nostril are several accessory cavities. The maxillary antrum, or antrum of Highmore, is a cavity in the upper jaw with an opening into the nose underneath the middle turbinate. This opening has many variations, and is normally under the anterior end of the middle turbinate, behind that of the frontal sinus. At this point there is a groove known as the hiatus semilunaris, formed above by a large cell of the ethmoid, called the bulla ethmoidalis, and below by a process of the ethmoid known as the processus uncinatus, a long bony plate running downwards and backwards from the tip of the middle turbinate and almost parallel with its lower border. Its purpose is to articulate with the superior maxillary by a bony plate projecting from it to the antrum, and with the inferior turbinate by a process from its lower border. These last processes, together with the inferior turbinate, close to a greater or less extent the opening between the nasal cavity and the antrum. See Fig. 4.

The hiatus semilunaris is crescentic in shape, with a direction downward and backward. In addition to the frontal sinus and maxillary antrum opening into the hiatus, several of the anterior ethmoidal cells

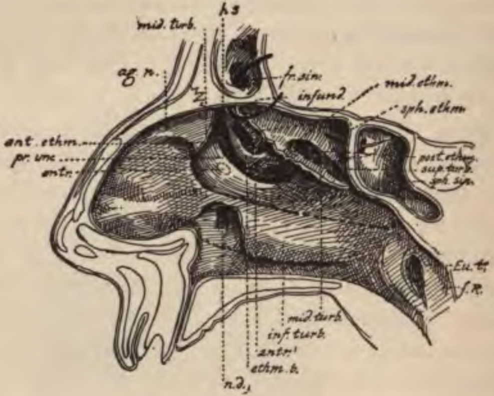

FIG. 4. Sketch shows the position of the orifices of the air cells and other passages leading into the nasal fossæ. sph. ethm., probe passed into sphenoid sinus, sph. sin.; post. ethm., openings of posterior ethmoidal cells beneath the superior turbinate; mid. ethm., openings of middle ethmoid cells; ethm. b., bulla ethmoidalis; h. s., hiatus semilunaris into which open anterior ethmoidal cells, ant. ethm., and maxillary antrum, antr., and the occasional additional opening, antr'; pr. unc., uncinate process; infund., infundibulum leading to frontal sinus, fr. sin., through which a probe is passed; n.d., orifice nasal duct underneath inferior turbinate; Eu. t., Eustachian tube; f.r. fossa of Rosenmuller (E. A. Schäfer in Quain).

also have their openings here. In front it comes as far as the turbinate; behind, not so far. There is an occasional accessory opening from the antrum into the hiatus semilunaris behind the natural opening. The antrum reaches above to the floor of the orbit and below to the alveolar process, and its floor is normally somewhat lower than that of the floor of the nose, though it may be higher. The second bicuspid and first molar lie directly underneath, and sometimes the first bicuspid is under the antrum. If the roof of the palate is very high, the alveolar process roof low, the alveolar process is thinner The antrum is subject to great variations in the size and thickness of its walls, and in its position relative to the teeth and to the nasal cavities, nor are the two

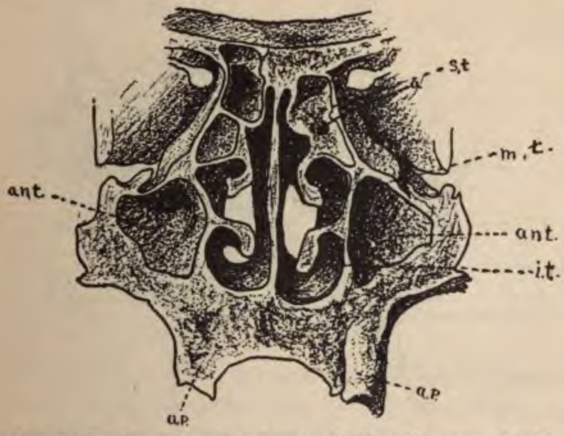

FIG. 5. Section through posterior half of the nose. Small antrum cavities with thick walls; s.t., superior turbinate; m.t., middle turbinate; ant., antrum; i.t., inferior turbinate; a.p., alveolar process; a, bristle passed through one of the posterior ethmoid cells (Hajek).

antrums necessarily alike, as is shown by the accompanying cuts. (See Figs. 5, 6, 7, 8.) If the inferior meatus is very much enlarged outwardly, the antrum cavity is correspondingly narrow. There may be a bony division line in the cavities, partial or complete. (See Fig. 9.)

The frontal sinus occupies a space above the root of the nose, extending laterally over the roof of the orbit. It goes half way up the forehead to the superciliary line, and extends about 1¼ inches outwardly; these dimensions vary greatly. The division line between the two cavities is seldom in the middle, and may fail entirely. The frontal sinuses are not present in childhood, developing somewhere about the age of puberty. The natural opening is downward into the hiatus semilunaris, and thence into the cavity of the nose, underneath the anterior end of the middle turbinate. These sinuses can sometimes be probed from below, at other times it is impossible, owing to the variations in the course of the canal. To enter the frontal sinus the probe must enter the hiatus, and then be turned upwards and inwards away from the orbital cavity.

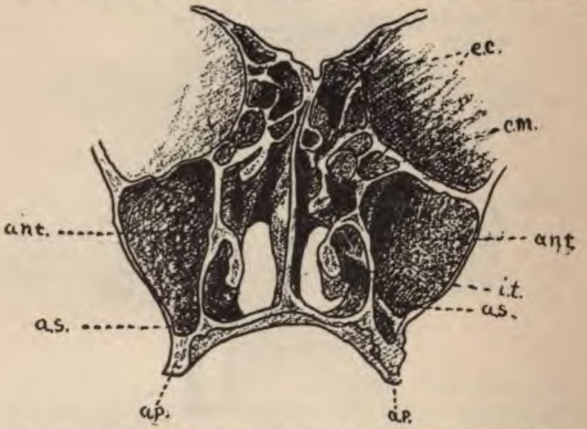

FIG. 6. Section of nose showing large antrum cavities with thin walls and an alveolar sinus; e.c , ethmoidal cells; c.m., middle turbinate; ant., antrum of Highmore; i.t., inferior turbinate; a.s., alveolar sinus; a.p., alveolar process (Hajek).

The sphenoid cells are two irregular cavities lying in the body of the sphenoid, behind the posterior wall of the nose above the choanæ. The walls are thin, with the exception of the under wall, which is usually thicker and forms part of the roof of the naso-pharynx. The cavity is always somewhat higher than the middle turbinate of the corresponding side, and the natural opening is toward the front of the nose into the superior meatus. A probe passed along the middle meatus to the middle of the middle turbinate, and then depressed to the floor of the nose, would, if prolonged, pass into the sphenoid cavity. (See Fig. 10.)

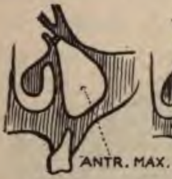

FIG. 7.

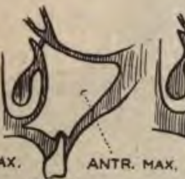

FIG. 8.

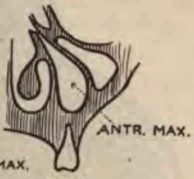

FIG. 9.

FIG. 7. Normal antrum of Highmore.
FIG. 8. Large antrum cavity with thin walls. Root of tooth has pushed floor of antrum up somewhat.
FIG. 9. Showing bony septum completely dividing the antrum; only the inner half has communication with the nose through the natural opening (Zarniko).

The naso-pharynx is a quadrilateral cavity formed in front by the choanæ and soft palate; above by the body of the sphenoid and basilar process; behind by the occipital bone, and the atlas and axis vertebræ; below, it opens into the cavity of the mouth. Its dimensions are given by Luschka as three-quarters of an inch for its vertical and antero-posterior diameters, and one and three-eighths inches in width. It has, however, much variation in size and form. Its opening into the nares is fairly constant, but that into the oro-pharynx depends very much upon the palato-pharyngeus and palato-glossus muscles. The two Eustachian tubes open into it on a level with the floor of the posterior nares, and have ovoidal cartilaginous walls presenting in the anterior and lower portion of the lateral wall, the posterior lip of which is much thicker and more prominent than the anterior. The opening known as the pharyngeal orifice is two-fifths of an inch vertically, and one-fifth of an inch transversely. Normally, the tube is closed, but is opened during the act of swallowing by the contractions of the tensor and levator palati muscles. Between this and the posterior pharyngeal wall is a space known as the fossa of Rosenmüller. This

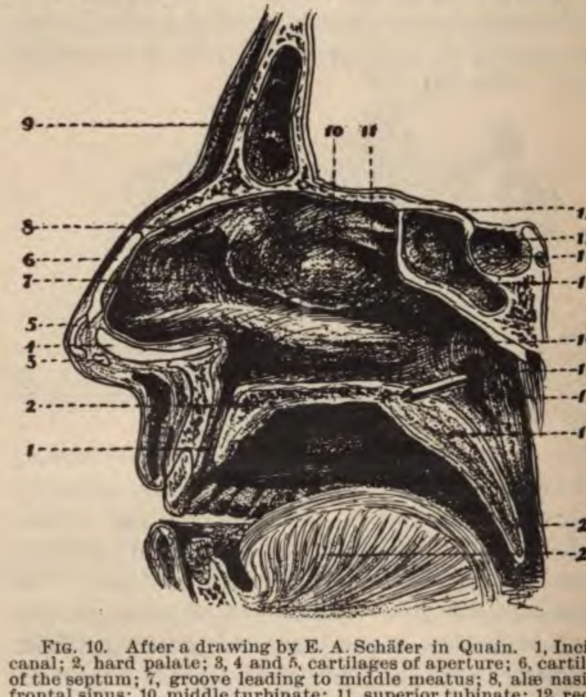

FIG. 10. After a drawing by E. A. Schäfer in Quain. 1, Incisor canal; 2, hard palate; 3, 4 and 5, cartilages of aperture; 6, cartilage of the septum; 7, groove leading to middle meatus; 8, alæ nasi; 9, frontal sinus; 10, middle turbinate; 11, superior tubinate; 12, recess above superior turbinate; 13, opening into sphenoid sinus; 14, pituitary fossæ; 15, sphenoid sinus; 16, inferior turbinate; 17, rod passed into Eustachian tube; 18, salpingo-pharyngeal fold; 19, soft palate; 20, uvula: 21, tongue.

fossa is of importance in the operation of catheterizing the Eustachian tube, being sometimes mistaken for the opening of the tube. On the roof or vault of the naso-pharynx and its posterior wall is a collection of follicular glands known as Luschka's or the pharyngeal tonsil. It lies between the orifices of the Eustachian tubes, and appears as a soft cushion traversed by fissures in various directions. Normally, it should not be over one-fourth of an inch in thickness, and should not cause occlusion of the space or pressure upon the Eustachian opening. It is composed of lymph follicles, or adenoid tissue, and covered with mucous membrane of columnar, ciliated epithelium. It is hypertrophy of this structure which brings about the condition known as adenoid growths.

The oro-pharynx extends from the free edge of the soft palate downward to the level of the greater horn of the hyoid bone. Its posterior wall is formed by the constrictor muscles, its lateral walls by the palato-glossus and palato-pharyngeus muscles, commonly known as the anterior and posterior pillars of the pharynx, between which lie the two faucial tonsils. It opens in front into the cavity of the mouth, and below the larynx and esophagus open into it. Its blood supply comes from the ascending pharyngeal, vidian and descending palatine arteries. Its sensory nerve supply is from the glosso-pharyngeal, its motor from the glosso-pharyngeal and pneumogastric.

The skin of the face is reflected into the vestibular portion of each nares, and shades away into tissues having elements of both skin and mucous membrane, soon becoming true mucous membrane at the junction of the vestibule and nares proper. Squamous epithelium covers the lining membrane of the vestibule, and contains sebaceous follicles and filtering hairs. The nose is everywhere lined with mucous membrane, both in the nose proper and the accessory cavities. In its lower portion the epithelium is columnar and ciliated; above it is devoid of cilia, the lower half of the middle turbinate being covered with cilia, while above

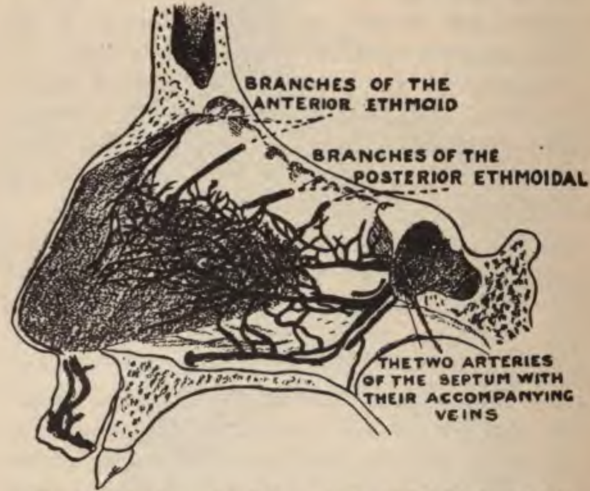
BRANCHES OF THE ANTERIOR ETHMOID
BRANCHES OF THE POSTERIOR ETHMOIDAL
THE TWO ARTERIES OF THE SEPTUM WITH THEIR ACCOMPANYING VEINS

FIG. 11. Blood supply of the septum. (After Zuckerkandl.)

that point there are none. The ciliated region is the respiratory portion; the non-ciliated, the olfactory. Over the cartilaginous and bony septum the mucous membrane is very thin, and firmly adherent to the bony portion, less firmly to the cartilaginous.

The anatomy of the nasal chambers is greatly changed from that of the bare bones when the latter are covered with mucous membrane. The spaces between the septum and turbinates are lessened; the meatuses are narrowed; all the outlines are rounded and softened; while the orifices into the accessory cavities are very much narrowed, and apparently obliterated. The glands are tubular only, but extend to the deeper layer of the mucous membrane. The mucous membrane of the nasopharynx is covered with cylindrical and ciliated epithelium, and contains abundant glands. In the pharynx proper the mucous membrane is squamous celled, farther down columnar and ciliated; while the glands are muciparous and lymphoid. The color of the mucous membrane varies from very pale in the anæmic subject to dark red in the alcoholic, being normally a rather deep pink. The blood supply of the nose is very abundant, and comes from the internal maxillary, the spheno-palatine, the ethmoid, the posterior nasal, the ascending palatine and the septal arteries. (See Fig. 12.)

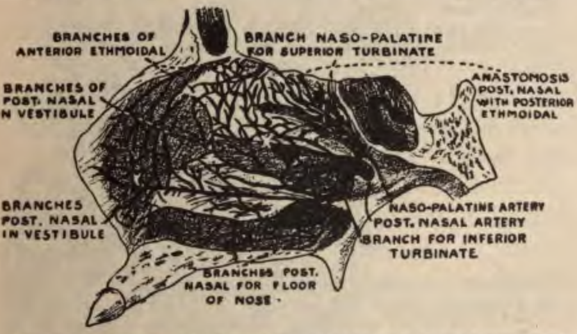
BRANCHES OF ANTERIOR ETHMOIDAL
BRANCH NASO-PALATINE FOR SUPERIOR TURBINATE
BRANCHES OF POST. NASAL IN VESTIBULE
ANASTOMOSIS POST. NASAL WITH POSTERIOR ETHMOIDAL
BRANCHES POST. NASAL IN VESTIBULE
NASO-PALATINE ARTERY
POST. NASAL ARTERY
BRANCH FOR INFERIOR TURBINATE
BRANCHES POST. NASAL FOR FLOOR OF NOSE.

FIG. 12. Blood supply of the turbinates and accessory cavities. (After Zuckerkandl.)

The mucous membrane covering the inferior turbinate and the lower half of the middle turbinate is of peculiar structure, and contains what is known as the erectile tissue of the nose. There is first the ordinary mucous membrane covered with ciliated cylindrical epithelium, with the ordinary capillary blood supply, which is here very abundant. Underneath this, between it and the periosteum, is the real erectile tissue, which consists of a number of wide, freely anastomosing venous spaces with fibrous tissue between them, and coursing at right angles to the surface of the mucous membrane. (See Fig. 13.) This erectile tissue is able to vary its blood supply very quickly and within very wide limits, sufficiently so as to cause the mucous membrane to lie close to the septum, or it can so empty itself as to leave no appearance of there being such a structure. Its blood

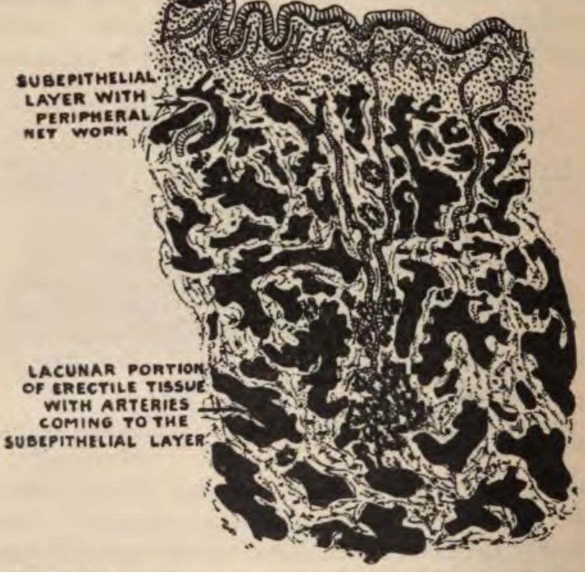
SUBEPITHELIAL LAYER WITH PERIPHERAL NET WORK
LACUNAR PORTION OF ERECTILE TISSUE WITH ARTERIES COMING TO THE SUBEPITHELIAL LAYER

FIG. 13. Section of mucous membrane of inferior turbinate, showing erectile tissue. Very highly magnified. (After Zuckerkandl.)

supply comes from a number of small arteries with a corkscrew-like course throughout the erectile tissue, so that they may readily fill the spaces with blood. Zuckerkandl considers the mucous membrane to extend to the periosteum, because glands are found to that depth, but the covering of the turbinate can with just as much justice be described as a mucous membrane, underneath which is an erectile tissue. It is controlled by sympathetic nerve fibers from the spheno-palatine ganglion.

The nerve supply of the nose is not important from the surgical standpoint, and comes from the nasal branches of the ophthalmic, superior maxillary branches of the trigeminus, and branches from Meckel's ganglion. The nerves of common sensibility for the mucous membrane and the nasal fossæ come from branches of the fifth pair.

The olfactory nerve comes from the olfactory bulb, passes through the cribriform plate, and is distributed to the upper third of the septum, the superior turbinate, and the upper third of the middle turbinate.

The lymphatics are unimportant.

The veins of the nose empty into the longitudinal sinus, or into the orbital veins, and disturbances in the blood supply may produce headache of meningeal origin.

The blood supply of the naso-pharynx comes principally from the ascending pharyngeal, ascending palatine, and branches from the internal maxillary. palatine, and spheno-palatine arteries. The veins terminate in sinuses at the base of the skull. The nerve supply comes principally from the second division of the fifth pair and glosso-pharyngeal.

The tonsil should normally lie between the anterior and posterior pillars of the pharynx, extending downwards as far as the base of the tongue. It is in the anterior part of the pharyngo-maxillary interspace, while the internal and external carotid arteries, the internal jugular vein, and the pneumogastric nerve pass through the posterior portion. Above the tonsil is a small triangular space, known as the supratonsillar fossa. It is sometimes of importance. If the tonsil projects beyond the anterior pillar it may be considered as pathological. There is great variation in size, the average being three-quarters of an inch vertically by one-third of an inch in breadth. It is made up of a number of pieces of glandular tissue, in which are depressions called lacunæ, or crypts, which crypts are frequently foci of infection. The crypts are round or slit-like openings, arranged

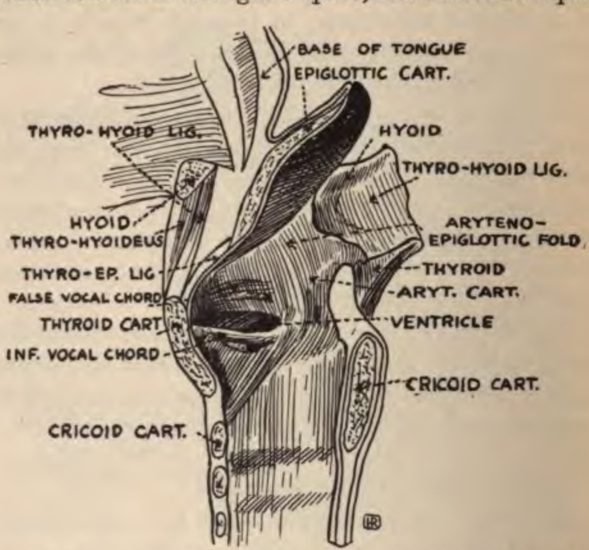

FIG. 14. Section of larynx, right half. (Gerrish after Testut.)

in more or less parallel columns, and leading deeply down into the tissue, and everywhere covered with mucous membrane. These crypts and their contents are, in the normal condition, visible only when the anterior pillar is drawn forward. Its blood supply comes from the tonsillar artery. It is not constant in origin, coming from the ascending palatine, pharyngeal, or the carotid, usually from the ascending palatine. The carotid itself lies one and one-half centimetre behind the outer border of the tonsil, and is not likely to be endangered when the tonsil is removed.

At the base of the tongue are some bits of lymphoid tissue, which are frequently enlarged, known as the lingual tonsils. They consist of a series of smooth, soft lymph follicles, nearly always single. At times they enlarge and become pathological. The two palatine arches, or, more accurately, the palato-pharyngeus and palato-glossus muscles, are important anatomical structures, and have to be considered in all operations on the tonsil.

Behind and partly attached to the base of the tongue is found the epiglottis, or covering of the larynx. (See Fig. 14.) It is of various forms, from a simple leaf-like appearance to that of the saddle or omega form. In children it hangs more downward than it does in adults, and tends to make the examination of the larynx very difficult. During respiration the epiglottis maintains an approach to the vertical position.

The larynx, or voice box, is held in position by ligaments attached to the hyoid bone, to the various cartilages, and to the base of the tongue. It is composed of a number of cartilages, the larger, or thyroid, made up of two wings, meeting together in the middle line where they form a deep notch, open behind, and with two sets of projections called the superior and inferior horns. Underneath this lies the cricoid, narrow in front, broader and higher behind, articulating with the thyroid and arytenoid. (See Fig. 15.)

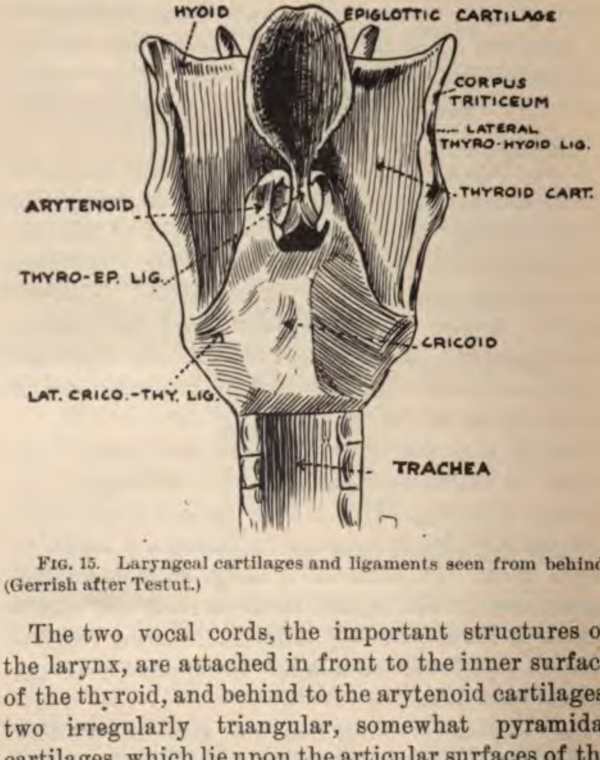

FIG. 15. Laryngeal cartilages and ligaments seen from behind. (Gerrish after Testut.)

The two vocal cords, the important structures of the larynx, are attached in front to the inner surface of the thyroid, and behind to the arytenoid cartilages, two irregularly triangular, somewhat pyramidal cartilages, which lie upon the articular surfaces of the cricoid, and have motion outwards, downwards and backwards. The thyroid also articulates with the cricoid, an upward and downward motion resulting.

With the aid of these four cartilages and the muscles which are attached to them, the vocal cords are enabled to alter their tension, and to open and close, as may be necessary, for breathing and speaking. The muscles may be divided into those which open and close the glottis. For the detailed anatomy and action of these, the reader is referred to the text-books on anatomy.

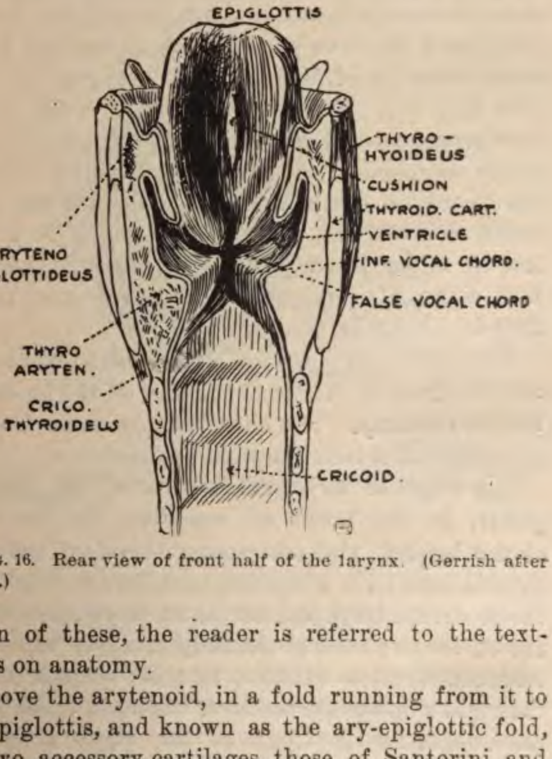

FIG. 16. Rear view of front half of the larynx. (Gerrish after Testut.)

Above the arytenoid, in a fold running from it to the epiglottis, and known as the ary-epiglottic fold, lie two accessory cartilages, those of Santorini and Wrisberg. The true vocal cords are two white fibrous bands covered with squamous-celled epithelium, usually pure white, though they may have, even normally, a pinkish cast. They are attached posteriorly to the vocal process of the arytenoid, and this point is of some importance, since the change in the color, with a slight hollowing at this point, may lead to a suspicion of an ulceration which is not present. Outside, and a little above the true cords, is a muscle called the external thyro-arytenoid, more commonly known as the false cord, and between which and the true cord is a small opening known as the ventricle of Morgagni, or laryngeal ventricle. (See Fig. 16). This space is lined with mucous membrane covered with ciliated epithelium, and is richly supplied with glands, from which considerable secretion comes at times. Between the arytenoids, at about the level of the cords, is a space known as the interarytenoid space; it is here the first signs of laryngeal tuberculosis are usually found. (See Fig. 17.)

The thyroid and cricoid give form to the larynx, and the front of the cricoid is one of the landmarks for tracheotomy. The blood supply comes from the superior and inferior thyroid arteries.

The superior laryngeal branch of the pneumogastric is the nerve of sensation for the whole of the larynx, and the motor nerve for the crico-thyroid muscle. The other muscles are supplied by the recurrent laryngeal nerve, whose course is different on the two sides of the body, and is of importance on account of its relation to other structures. On the right side the nerve leaves the main trunk of the pneumogastric in front of the right subclavian artery. It passes around this from before backward, and ascends to the side of the trachea behind the common carotid and inferior thyroid arteries. It is in very close relation to the apex of the lung. On the left side of the body the nerve leaves the pneumogastric in front of the arch of the aorta, passes around it from before backwards, and then upwards to the side of the trachea. Both right and left recurrent nerves lie in the groove between the trachea and esophagus, passing beneath the lower border of the inferior constrictor muscles, and gaining entrance to the larynx posteriorly at the lower border of the cricoid cartilage. The anatomical relationships are of great clinical importance, since paralysis of the laryngeal muscles may result from pressure against the recurrent by aneurism of the subclavian or aorta; from inflammatory conditions in the apex of the right lung; from new-growths in this region, and from injuries or new-growths of the esophagus.

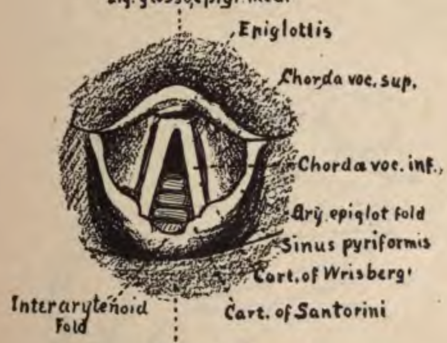

FIG. 17. Larynx as viewed in mirror from above downwards and reversed, what appears as anterior being really posterior. (After Moritz Schmidt.)

The laryngeal mucous membrane is mostly squamous, continuous with that of the pharynx. The mucous membrane is rather loosely attached to the submucous tissue on the epiglottis, posterior surfaces of the arytenoid, and aryteno-epiglottic folds. This accounts for the rapid swelling and œdema which occurs in inflammations in this region.

CHAPTER II.

PHYSIOLOGY.

The nose is an organ of respiration, the seat of the sense of smell, the resonating chamber for certain tones, a protection to the body by reason of the sense of smell, and a ventilating organ for the ears and accessory sinuses. Normal breathing is always nasal. The current of air has been proved by many experiments to pass mainly along the middle and superior meatuses, coming into the nasopharynx at the highest part of the choanal arch. (See Fig. 18.) This will explain the fact that a slight enlargement of the pharyngeal tonsil often impedes respiration more than does a considerable swelling of the inferior turbinates. As already described the mucous membrane covering the inferior

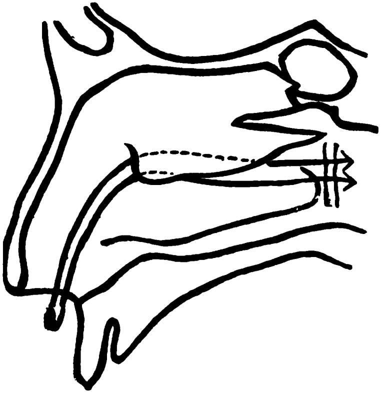

FIG. 18. The arrows show the direction of the inspiratory air current. (After Zarniko)

turbinate and the lower portion of the middle, contains vast systems of bloodvessels and erectile tissues that are the chief means whereby the inspired air is warmed and moistened. These are under the control of the sympathetic. In cold weather the vascular tissue becomes filled, the turbinates are swollen, and a larger amount of heat is furnished, in order to warm the air on its way to the lungs. An increase in the sensible secretion is not a necessary accompaniment of this process; it is due, when occurring, to increased sensitiveness of the mucous membrane.

The experiments of Aschenbrandt and Kayser show that inspired air receives from twenty to forty degrees of heat, and becomes about two-thirds saturated with moisture on its way through the nose. This condition of warmth and saturation is necessary for the proper interchange of oxygen and carbonic acid gas in the lungs, and that the saturation occurs in the nose is a fact readily observed by anyone who will breathe for a short time through the mouth. The resulting sensation of dryness and discomfort will be very marked, the air having taken what moisture it could from the throat, but being insufficiently moistened thereby. The nose should secrete normally about one pint of water daily in order to keep the inspired air at proper moisture point. The vibrissæ or vestibular hairs at the entrance, together with the moist mucous membrane covering the tortuous passages of the nose, act as a kind of filter for the inspired air, preventing much of the dust and débris of the air around us from reaching the lungs. The cilia are also of use in the same way. When the nose is too roomy, and insufficiently moist, and the filtering process fails to be properly accomplished, the person is apt to complain of a dry throat. The direction of the ciliary wave is towards the naso-pharynx, from whence particles of dust or debris can be expectorated.

Although the nose is not a perfect dust collector, still it retains the greater part of the dust inhaled, which either remains there or is blown out by the current of expired air. There is no provision for dust collection in the mouth. Hence it is evident that the nose in its normal condition is perfectly adapted for the breathing function, no matter what the variations of temperature or moisture, and that the mouth cannot normally take its place or properly do its work. Therefore, it follows that *mouth-breathing must be always pathological and dependent upon nasal or naso-pharyngeal obstruction in some form.*

On account of the important function the turbinates have of moistening and warming the inspired air, injury or destruction of them should be avoided so far as possible in all operations, and septal overgrowths be removed rather than a portion of the opposing turbinate.

Olfaction.—It has usually been stated that the olfactory epithelium reaches down to the middle of the middle turbinate and the opposing surface of the septum, although it is claimed by some observers (Schultze and Von Brunn, quoted by Freeman), that it does not reach below the edge of the superior turbinate.

In order to detect odors properly, the mucous membrane at this point must be normal; there must be unhindered nasal respiration, and the surfaces must be moist. The material smelled must either be in a gaseous state or one of a fine subdivision, and the power of sniffing ought to be present. There is a very intimate relationship between taste and smell, as is easily ascertained by holding the nose in eating. Whenever smelling is for the time impossible, or its sensitiveness much reduced, the sense of taste is very much altered, and at times entirely lost, as is always experienced during the progress of an acute coryza.

Accessory Sinuses.—These serve to lessen the weight of the face and act as resonating chambers.

Phonation.—For the proper production of natural tones, the naso-pharynx should be free from obstruction, as should also all the nasal passages and accessory sinuses, since the voice gains its strength and character from the reverberation of air contained in these passages.

Function of Phonation.—After waves of air are set in motion, the tone is amplified in the surrounding air, and then modified by the pharynx, oral cavity, palate, tongue, teeth, lips and nasal cavities. In consonant speech the palate does not shut off the naso-pharynx cavity, but hangs free; hence, the naso-pharynx must be free from all obstruction for satisfactory voice production. This explains the thick voice which children with adenoids and enlarged tonsils have. Freeman has stated that the explanation of the musical voice of the African negro, as compared with the unmusical tones of the American Indian, lies in the greater size of the antra of the former race. Native Australian negroes having no frontal cavities have voices singularly lacking in resonance.

The Protective Function.—This is a highly important one in the lower animals, and to a certain extent in man, since the entrance of irritating materials, or the presence in the vicinity of irritating odors or substances, is promptly made known by the nose, frequently being accompanied by the reflex action called sneezing; this is followed by a free flow of mucus, which tends to the removal of the offending material.

In connection with the naso-pharynx the nose acts as a ventilating chamber for the middle ear, and interference with nasal respiration has a marked effect on the proper performance of the functions of the ears.

The naso-pharynx has no special physiology; growths and pathological conditions therein are important because they interfere with nasal respiration and with the ventilation of the ears, being productive of many serious conditions, which will be considered in their proper places. The pharynx and adjacent region, the tongue and larynx are well supplied with sensitive nerves, and retching is easily brought about by even the slightest examination.

The physiology of the tonsil is still imperfectly understood. They may have some value as protective organs and as germinating centers for leucocytes. Goodale has shown that absorption can readily take place from their crypts; the intense general prostration which usually accompanies a tonsillitis would seem to clinically prove this observation to be true. Whatever its normal physiology, it is certain that the less tonsil a person has the better it is for him, and the removal of enlarged and pathological tonsils has been, in the experience of all specialists, invariably productive of benefit to the individual.

The soft palate and uvula serve as a curtain to shut off the cavity of the naso-pharynx from that of the mouth in eating and drinking and speaking, as may be needed. Its important function in this regard is strikingly illustrated in paralysis of the soft palate, when speech becomes almost unintelligible, and food and drink regurgitate into the nose.

The larynx acts as the protector of the delicate structures below, and as the organ of voice production, and also as a portion of the respiratory tract. Anything irritating which enters the larynx, either solid, liquid or gaseous, immediately sets up coughing and an attempt at the expulsion of the irritating substance.

The epiglottis acts as a cover for the larynx during eating and drinking, and should anything by chance get by this and into the larynx there is an instant demand for its expulsion.

Sound is produced by the forcing of the expiratory current of air between the two vibrating surfaces—the vocal cords. Its quality, pitch and loudness is regulated by the force of the expiratory air current and the tension of the cords; this latter is controlled by the muscles and cartilages of the larynx. When no attempt at speech is being made, the two vocal cords are widely separated, and take no part in the act of breathing. Coughing is a violent expulsive act against a partially closed glottis.

CHAPTER III.

GENERAL SYMPTOMATOLOGY, ETIOLOGY AND PATHOLOGY.

The word most commonly used by patients who have some trouble in the upper air tract to describe their symptoms is "catarrh." This one word, to the patient's mind, covers the whole range of troubles in this region. The term has also acquired a certain amount of usage among physicians, and is frequently applied by them to any trouble in this region which cannot be, or is not, better named. The word means "to flow downward," and is properly used to refer simply to a discharge from the mucous membrane, without in any way giving information as to the true pathology or cause of the affection. Bosworth objects to the term as having no definite pathological significance, and regards it as merely a symptom of many of the diseases which affect the upper air tract. At the same time, there is quite a range of the simpler inflammations of the upper air tract which may be properly called catarrhal inflammations, assuming, of course, that the word catarrhal is used as a symptom term, and not as an etiological or pathological one.

The affections of the nose and throat are those which are incident to a highly vascularized mucous membrane, the medium of communication between the external air and the lungs. It is liable to inflammations from simple acute to chronic, brought about by changeable temperature, winds, variations in atmospheric moisture; irritating gases or vapors;

dusty streets; defective digestion; the catching of cold from one cause or another; disturbances due to faults in the bony anatomy; the constitutional conditions of syphilis and tuberculosis; rheumatism; congestion, cardiac or renal in origin; and by the various new-growths found in other parts of the body. As elsewhere, so here, the condition of one's general bodily health has a great influence on the condition of the mucous membrane of the upper air tract. To find a congested nasal mucous membrane, and at once proceed to reduce it with cautery or other means without a careful inquiry into the general health is an error. Every part of the body must be viewed with regard to its relation to other parts, and the nasal condition may be only the visible manifestation of trouble in the heart or kidney.

One of the commonest visible signs of trouble in the upper air tract in adult or child is mouth breathing. Anything which narrows the respiratory portion of the nose or naso-pharynx will cause mouth breathing, the degree of which will depend upon the extent to which the narrowing process is carried. Subacute or chronic inflammation of the pharynx, larynx and bronchi usually follows, and with these conditions the tendency to the infectious diseases of the lungs is increased; the facial aspect changes, the under lip hangs down, the general appearance is one of sleepiness and dulness; there are disturbances of voice production; the pharynx becomes dry and feels as though there were something in it which must be gotten rid of. Inflammations of the tonsil and enlargements of the general lymphatic system are frequently present; the teeth decay earlier than in nose breathers and the appetite is poor. Nursing children are frequently insufficiently nourished, take the breast badly, and cry a good deal.

Faulty development of the nose and upper jaw may be a result as well as a cause of mouth breathing. The shape and appearance of the upper jaw are very greatly modified during the period of development, usually by the fifth year.

The thorax is liable to incomplete or pathological development, especially in weak, scrofulous individuals, owing to the fact that the lungs are insufficiently filled with air during the earlier years of childhood, so that the person suffers in a measure from oxygen starvation; dyspnea is frequently complained of, and there is a less sustained power of breathing during exertion. Headaches frequently follow, and the general intelligence may be impaired. The sense of smell is disturbed, since its sharpness is dependent very much, in fact almost entirely, upon the proper performance of nasal breathing. Mechanical or functional stammering, and reflex neuroses may result from this cause. Deafness is one of the results of mouth breathing. That hearing may be normal it is necessary that the mouth of the Eustachian tube be free from any inflammation or pressure, and its ventilation unhindered; hence, the nasal and naso-pharyngeal mucous membrane must be practically normal.

The causes of nasal obstruction resulting in mouth breathing may be congenital or acquired; closure of the nostrils, paralysis of the alæ, hypertrophies of the inferior or middle turbinates, diseases of the ethmoid bone, polypi, deviations of the septum, exostoses, ecchondroses, foreign bodies, new-growths, hypertrophies of the pharyngeal tonsil, are among the most common of the causes, all of which will be considered in their proper place. Acute catarrhal rhinitis produces temporary stenosis of the nose, as do diphtheria, scarlet fever and measles. Many persons will say that they breathe through the nose when a careful examination will reveal the fact that most of the breathing is done through the mouth, especially at night.

Aside from recent acute conditions, a purulent discharge from the nose is indicative of suppurative inflammation of some one or more of the accessory sinuses or the ethmoid cells; of a chronic rhinitis with more or less destruction of the mucous membrane; of necrosis of the bony structure of the septum and adjacent bones from some constitutional condition, as syphilis; or of malignant new-growths such as sarcoma and carcinoma in the nose; with, as a rule, the same ultimate results as in other parts of the body.

Any general constitutional condition, as constipation, failure of the heart to do its work properly, inflammation of the kidney, general plethora, anemia, disturbances of the stomach, all have their effect on the mucous membrane of the nose, pharynx and larynx; whatever interferes with the circulation of the blood, either in the thorax or in the throat itself, is a cause of disease. The eye will be frequently affected in sympathy, since the nose is the outlet of the lachrymal canal, and its vessels have numerous anastomoses with those of the orbit and the ball of the eye.

Diabetes causes a dry pharynx, and hysteria and neurasthenia have their group of symptoms referable to the throat. Anything that lowers the general bodily resistance may be reflected in the mucous membrane of nose and throat. The character of any nasal or pharyngeal discharge, whether simply mucous, muco-purulent or purulent, and the presence or absence of odor at the place of discharge will be somewhat indicative of the pathological conditions which give rise to it.

Pathogenic micro-organisms are not found to any extent in the nose beyond the vestibule, and infectious diseases of the nose are not common. The throat proper, or pharynx, contains many bacteria. The tonsil is frequently the seat of pathogenic organisms, and the pharynx and larynx are not infrequently invaded by diphtheria, and are affected in all the infectious diseases.

Pain is a comparatively uncommon symptom in the nose, but invariably present in the acute affections of the throat and larynx, when difficulty in swallowing or breathing is complained of.

Disturbances of speech result from the acute and chronic affections of the larynx, and are among the early signs of inflammation in that locality. The uric acid diathesis, and its twin brother, rheumatism, affect the pharynx and tonsillar region. The constitutional conditions of syphilis and tuberculosis almost invariably show their presence in the upper air tract at some time or other in the course of the disease.

Catching cold is an important pathological factor in diseases of the upper air tract and will probably be stated as the cause by the patient oftener than any other. Several theories have been advanced to explain the phenomena ordinarily described under the head of "a cold," and none of them are entirely satisfactory. The mechanical theory is as follows: cold and dampness, or a sudden draught of cold air at some unprotected part of the body results in a chilling of some portion of the circulatory system, the vaso-constrictors act upon the external capillary circulation, the peripheral blood supply is diminished, and more blood thrown into the central vessels. Normally, these care for it, but if the internal resistance is below normal, there will be a dilatation of capillaries from over pressure at the weakest point, and a hyperemia or congestion results, followed, if the case goes on, by migration of leucocytes and a transudation of serum through the walls of the vessels to the surfaces of the mucous membrane, to become later suppurative, unless healing sooner takes place.

On the other hand, Bosworth regards taking cold as due to a disturbance of the nice adjustment which exists between heat production and heat waste, and is opposed to the mechanical theory.

In chronic conditions he regards the absolute amount of fluid poured out in the nose as diminished, while the secretion itself is much thicker. Under these conditions there is an apparent excess of secretion, but the reason that this excess is only apparent and not real is that the current of air passing from the nose to the throat is normally nearly saturated with moisture; when, however, inflammation, subacute or chronic, is brought about, the amount of water given off is diminished, the discharge contains more mucus, becomes thicker, adheres tenaciously to the place where it is formed, and is discharged with difficulty; hence a feeling on the part of the subject that the absolute amount of secretion is increased, whereas it is really diminished. This is easily appreciated by watching a case of atrophic rhinitis, in which the secretion is thick, dries as fast as it is exuded, and where the mucous membrane is extremely dry, its glandular structure largely destroyed, and its ability to give off water greatly diminished.

The reason the nose and throat are so frequently affected as the result of a cold is, that their blood supply is abundant, their capillary circulation freely anastomoses with all parts of the area, and the erectile tissue readily engorges with blood, producing pressure on adjacent parts, considerable swelling, and interference with the return circulation. In the throat the mucous membrane is for the most part loosely attached, and while not swelling so readily as in the nose, yet becomes very quickly swollen with almost immediate interference with the functions of voice production, and frequently with those of swallowing, and does not yield so readily to treatment.

CHAPTER IV.

INSTRUMENTS.

A great deal of good nose and throat work can be done with a limited armamentarium provided it is carefully selected. I shall describe what I regard as necessary for the physician who is going to do the average amount of nose and throat work likely to come to his hand, and shall omit the more complicated instruments and those requiring exceptional skill in their manipulation. Further instruments may be obtained as needed. The models change constantly for the better, and old ones are being discarded; hence buy only what is needed, and the best pattern of any instrument. Choose an instrument with regard to the work it is to do, and not because the instrument maker recommended it, or Dr. Jones invented or uses it.

The cavities to be examined are dark ones; the first provision must therefore be for a source of light which will be of a constant character, and to which one can readily accustom himself. Arrange to darken a corner of the office, or else put dark curtains on the windows, so that the external light can be at all times excluded. This is not absolutely essential, but the vision will be sharper and the examination easier if most of the side light be shut off. Plan to have the light from nine to twelve inches to the right of and somewhat behind the patient. While the light can be used from either side, it is easier to manipulate at the patient's right, and this position is preferred by most operators. An adjustable gas bracket which allows the light to be moved at will upwards and downwards and from side to side can be obtained from gas fixture dealers or the surgical instrument house. While the incandescent gas light gives a good white light, I do not personally like it, since the intense whiteness of the flame tries the eyes more than the yellow flame of the Argand gas burner, which is the one I generally use. To one doing but little work in this line this objection would be a trivial one. Electricity is now available in all places of any size. For this purpose, a ground-glass lamp of about twenty-four candle power is preferable. Where neither gas nor electricity can be had the student lamp is the most serviceable form of kerosene oil lamp, as it can be raised and lowered at will. It occupies but little space and can be placed on the same table where lie the various other things needed. I have frequently used it in preference to electricity, and find the light entirely satisfactory. Gas or oil illumination has the advantage over electricity in that instruments can be warmed over the flame, while an alcohol lamp must be used when electricity is the source of light. A Mackenzie condenser intensifies the rays of light, but it is not generally used owing to the fact that the rays of light from the condenser must always fall on the forehead mirror, and this limits somewhat the range of motion of the operator, since the source of light is easily lost. This is especially trying when one is also examining the ears. Its use or non-use is a matter of individual preference; my own Mackenzie condenser has lain in the bottom of a drawer for the last six years. At the left of the patient have a spittoon; a tall deep one is preferable. The best type of all is the fountain spittoon, though not necessary unless a great deal of work is to be done.

The first thing essential is the mastery of the forehead mirror. Choose one about three and one-half inches in diameter, with good-sized eyehole and a band which comfortably fits the forehead, and which can be readily folded up and carried in the inside pocket; do not have one with knobs to rest on the nose. There must be an ability to pick up the light from any source—lamp, window, or tallow candle—and make the same instantly available, following the movements of the patient with the mirror so that the light is practically constant no matter how much the the patient may move. The forehead mirror will be found almost indispensable in general work, since the throat of the person lying in bed can be seen almost as readily as if we had him in the office, without shifting his position at all. Have some one hold the lamp or candle to the right of or a little behind the patient, and the physician accustomed to the forehead mirror can do the rest. The patient's chair should have a high back, and the operator should sit in front and at the right side of the patient, and not exactly in front of and with his knees around the patient's knees, as is frequently advised. Just as good work can be done in the position at the side, and the freedom of motion of both physician and patient is

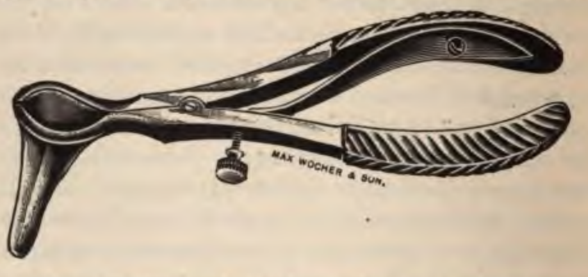

FIG. 19. Bivalve nasal speculum. These are made of various sizes with varying widths of blade.

much greater, to say nothing of other objections to the knee to knee position.

Provide two sizes of a simple bivalve nasal speculum; one with smaller blades so as to be readily used for children. (Fig. 19.) The one known as Kramer's, or some modification of it, seems to me the most suitable. It should have smooth edges that will not hurt the patient. Nearly all of the self-retaining speculums are unsatisfactory. Provide a number of tongue depressors, one of glass, and a good right-angled one with fenestrated blade. There are a great many types of these. Choose one which is readily held in the hand, holds the tongue firmly, does not hit the breast bone of the patient when used, and does not hurt when applied to the tongue. Have a long silver probe, which can be easily bent and can be used for exploring in the nose and throat. A number of applicators will be needed. I have found knitting needles each end being filed to render it rough, very satisfactory as cotton applicators. They hold the cotton securely and it is easily unwound from them. There are a number of special applicators on the market with twisted ends so as to hold the cotton without danger of its falling off. The individual taste can be satisfied in this regard.

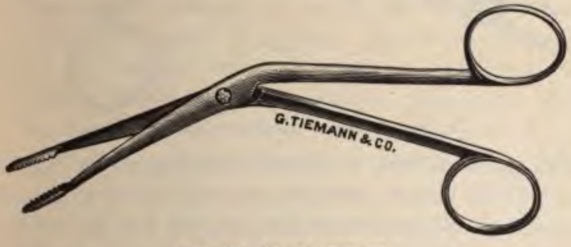

FIG. 20. Nasal forceps.

Camel's hair applicators are not to be recommended, on account of the impossibility of properly cleaning them.

A pair of long angular nasal forceps with ring handles, stout, but small enough so that they can be readily used anywhere in the nose, are required (Fig. 20); also a pair of long angular nasal scissors, and a pair of the latter with serrated teeth (Fig. 21).

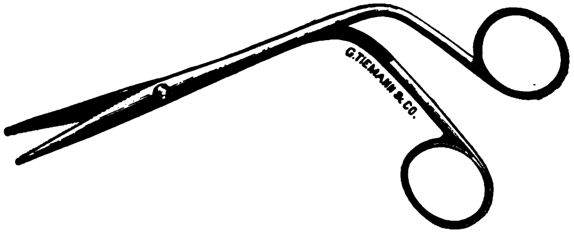

FIG. 21. Serrated nasal scissors (Potter's).

This pattern will be found very useful in amputation of the uvula, being more satisfactory than any of the complicated instruments sold for this purpose, since with the serrated teeth there can be no slipping.

Two or three nasal saws are needed; select those which cut from below upwards. The best choice will be a probe-pointed upper cut saw, cutting forwards, and fastened to the handle at an angle, and right and left bevelled edge saws with straight or angular handle (Fig. 22). This latter can be made to

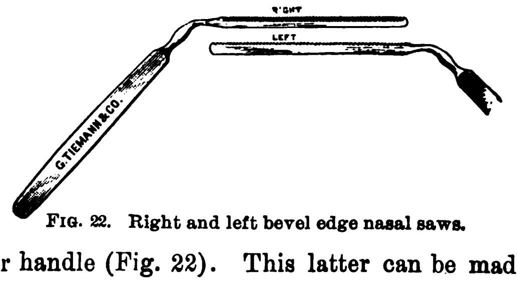

FIG. 22. Right and left bevel edge nasal saws.

take hold on the slanting surface where the ordinary saw with teeth at right angles cannot be made to bite. A medium sized Gottstein adenoid curette, or som

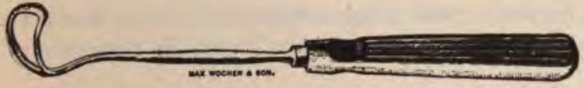

FIG. 23. Gottstein's adenoid curette.

modification thereof, will be required (Fig 23.) In selecting this instrument care should be taken to see that the cutting edge is so related to the rest as to conform to the natural curve of the naso-pharynx when the instrument is in use. Do not use a modification of Gottstein's curette known as Munger's, the blade of which is supposed to pass each side of the septum, but which, in consequence of its shape and very sharp spear-like cutting edge, is a dangerous instrument on account of the liability of its cutting very deeply and removing tissue which belongs in the naso-pharynx. Provide also a pair of

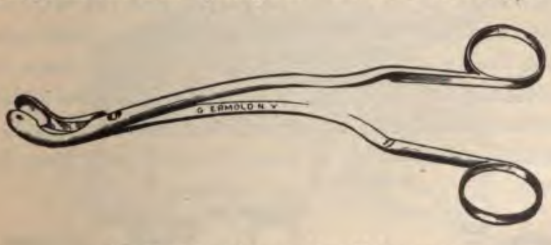

FIG. 24. Löwenberg's adenoid forceps.

Löewenberg adenoid forceps (Fig. 24), and see that they have good cutting edges and blades of fairly good size. Provide a pair of Myles' alligator nasal, cutting forceps for use in the nose, and a pair of the same instruments with wider blades for use on the tonsil. These forceps will be found very serviceable, being stout, and will cut away pieces of bone in the nose, or good-sized portions of the tonsil. What is known as the Teat cutting forceps will answer the same purpose for use in the nose.

Secure a good nasal snare, and number five piano wire for use in it. A snare in which there is a pin at the end of the barrel and a thumb screw where the wire is attached is much preferable to one in which there is no pin in the barrel, and the wire has to be twisted around the handle. In the latter case, if the first attempt at using the snare has been unsuccessful, the wire will have to be reapplied before the instrument can be again used, inasmuch as it is practically impossible to push the wire back from the barrel.

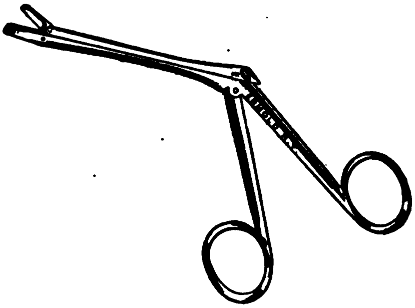

FIG. 25. Myles' nasal cutting forceps.

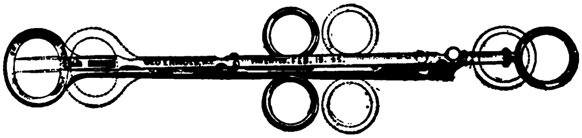

FIG. 26. Modified tonsillotome.

Two or three straight curettes and a larger angular one should be obtained for use in the nose.

Have two tonsillotomes of the modified Mackenzie or Matthieu pattern, one medium and one smaller (Fig. 26). Have a pair of probe-pointed curved tonsil knives, the pattern known as Leland's (Fig. 27), and a pair of small vulsellum forceps with which to grasp the tonsil. Obtain a pair of long uterine dressing forceps with which the naso-pharynx is readily reached in the case of hemorrhage, or for making an application. Procure two or three right-angled wire applicators for making applications to the naso-pharynx, and the same thing but much longer for making applications to the larynx.

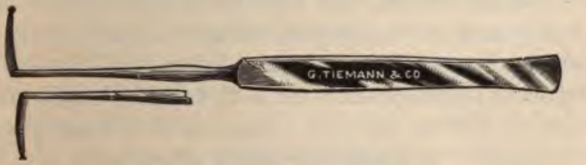

FIG. 27. Leland's tonsil knives.

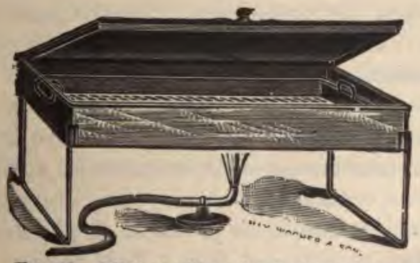

FIG. 28. Office sterilizer for instruments.

Provision should be made for thoroughly cleansing all instruments in the office (Fig. 28). A good post-nasal syringe and a good-sized straight syringe with a blunt tip, the former for syringing post-nasally and the latter for syringing the nostril, are requisite.

Sprays.—While a compressed air apparatus is not absolutely essential, it is very convenient, and if the physician is going to do much work it had better be provided, although good hand-atomizers with tips of varying shapes and sizes are procurable. The best atomizers for this purpose have metal tubes. They are easily cleaned, and any parts wearing out can be renewed. For spraying cocaine a glass atomizer with a spray which is not continuous is to be preferred. If compressed air is to be used, a tank and a pump will be required. Some form of hand-pump will answer very well, but where much work is to be done it will be more satisfactory if electricity, or water at any considerable pressure is available to pump the air by these methods. Efficient water pumps are made by several manufacturers and there is a good electric pump on the market. A reducing valve on the tank, so that the air may be used at any required pressure, is desirable. Of sprays to be operated by compressed air, the glass ones of the Sass pattern, and the metal ones of the Davidson type are the best. The old time hard rubber spray tube cannot be satisfactorily cleaned.

Galvano-Cautery Apparatus.—The use of the galvano-cautery, from being much advocated, has fallen somewhat into disuse; it is, however, an apparatus of much value, occasionally employed by every nose and throat worker, and to be provided if possible. The current can be obtained from a fluid battery or from the street current. The fluid cautery battery, if properly cared for by being kept clean and occasionally refilled, will be found always ready to work. If, however, the fluids are slopped, or only occasionally renewed, this form of battery will prove very unsatisfactory. In case the street current is available, a transformer and coil for cautery use supplied from this source is superior to any other method, since it is always ready for use. This cautery current can be obtained from either the alternating or direct system, the apparatus varying accordingly. The best cautery handle is that known as Schech's.

A galvanic battery is much used by the author for the treatment of subacute laryngitis. A base plate is used, and the supply taken from the street current. I do not, however, regard this as essential for the occasional operator.

There are several forms of nebulizer. They are somewhat impressive as bits of apparatus, and with an abundant air supply are probably of some value, since it is possible to divide the medicaments so very finely as to have them inhaled and even absorbed into the lungs. It is not my experience, however, that the glowing descriptions of their value as remedial agents given by the makers are realized in their daily use, although I employ several of them.

Instruments for special operations will be referred to under their respective heads.

An O'Dwyer mouth-gag, laryngeal mirrors, and a pair of right-angled laryngeal forceps for the removal of any foreign body at the base of the tongue or around the larynx, completes the list of necessary instruments.

CHAPTER V.

METHODS OF EXAMINATION.

No matter what the patient complains of, either in the nose or throat, carefully examine the whole tract from the nares to the larynx. Placing the patient in a high-backed chair, nine or ten inches from the light, let the physician seat himself on a stool in front and a little to the right of the patient, and throwing the light of his forehead mirror (which should be worn so that he looks through the hole in the mirror with one eye, keeping both eyes open) against the patient's face, he is ready to begin. First examine the external nares; then lifting up the tip of the nose throw the light first into one nostril and then into the other. Frequently, considerable information as to the condition of the introitus, the presence or absence of polypi, the condition of the inferior turbinate, the condition of the septum, whether straight, deviated, or having a spur, can be obtained. The nasal speculum, having been slightly warmed (and all instruments are to be used warm, but not hot), is now taken with the left hand, gently inserted into the nostril and opened sufficiently to give a good view, but not to hurt the patient. By alternately raising the head up and down, a view of the whole interior of the nostril can be obtained; the condition of the inferior and middle turbinates with reference to size and closeness to the septum; the presence of polypi; atrophy or hypertrophy of the mucous membrane; the presence of secretion, whether mucous, mucopurulent or purulent, fluid or dry, can all be observed at a glance. The same thing is then done on the other side in the same manner, and we are now ready to estimate the condition of the septum with reference to deviations, spurs, and thickening. The anterior septal cartilage is especially to be noticed, since it is frequently the seat of ulcerations and nose bleed. With the probe, any part which seems to deviate from the normal is now carefully examined: the inferior turbinate as to whether it pits under pressure, and if hypertrophied, whether such hypertrophy is real or only apparent; the middle turbinate and the ethmoidal openings as to the presence of polypi or degeneration, and for the marking out of their boundaries. In many cases the naso-pharynx is also visible from in front; in others the nasal cavities will be found so tortuous, narrow, or obstructed that a satisfactory examination of all the parts will be impossible. Usually, however, with care, all the structures can be examined.

The mouth is now opened widely, and inspected first by simple light, and the condition of the tongue and arch of the palate noted. The patient is then told to say *ah*, and the tongue, which before might have been in the way, will be found to be depressed, the soft palate will rise, the posterior pharyngeal wall will be visible, and the tonsils and their relation to the anterior and posterior pillars can be noted. The tongue depressor is now used, and the tongue depressed and drawn slightly forward, in order to bring more clearly into view the structures just mentioned; the tip of the epiglottis and base of the tongue are also frequently seen.

With the aid of a right-angled hook the tonsils themselves can be explored, the anterior pillars being drawn forward.

We are now ready to look into the post-nasal space. For this a small laryngoscopic mirror is necessary; the tongue should be well depressed; the mirror carried behind the soft palate and directed upwards, and the patient asked to breathe through the nose. When a satisfactory view is obtained, the septum, the inferior and middle turbinates, and frequently the superior, are plainly visible, and the image is not reversed (Fig. 29). By turning the mirror alternately a little sidewise from one side to the other, the orifices of the Eustachian tubes will be seen. At the same time, the roof of the naso-pharnyx is observed; the presence or absence of adenoids, and the condition of the mucous membrane noticed. In many individuals the post-nasal view is not obtainable, owing to the fact that they cannot control the elevators of the palate; a considerable amount of skill is requisite in this procedure, and even in skilled hands it frequently fails. To obviate this difficulty, certain

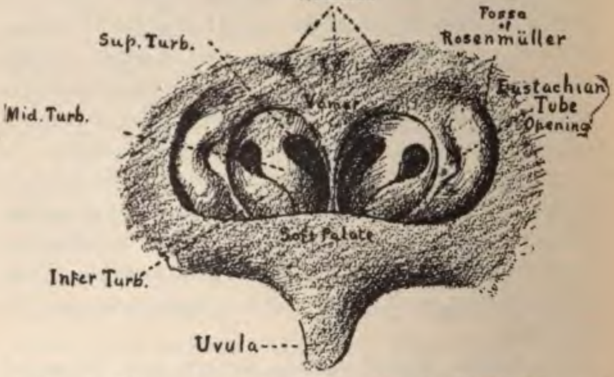

FIG. 29. View of posterior nares looking from behind forward (after Moritz Schmidt).

palate hooks and retractors have been devised; the most successful of these is that originated by Dr. Joseph A. White, of Richmond, Va. An ordinary palate hook can frequently be used to advantage.

Most persons can be examined up to the present point without the application of any anesthetic. Deep, quick breathing will frequently prevent the tendency to retching, and allow the completion of an otherwise impossible examination. Again, if the physician breathes as he wishes the patient to breathe, the patient will unconsciously imitate him; this is of special value in the examination of the larynx, for which we are now ready. Using a medium sized laryngoscopic mirror ask the patient to protrude the tongue, and gently grasping its tip with a napkin, without pulling on it, since the tongue is very sensitive and can easily be hurt, introduce with the right hand a previously warmed mirror to the back of the throat, pressing it gently but firmly against the tip of the uvula, and pushing the same up against the pharyngeal wall, holding the mirror at such an angle that the rays of light will be reflected downward into the larynx. With the mirror in this position (and considerable practice will be required to do it quickly and easily without producing retching) ask the patient to breathe slowly through the mouth. This will allow the glottis to be widely opened, the epiglottis to be lifted, and will give the position of the cords as they are in normal breathing. When this is satisfactorily accomplished, ask the patient to say *ā*, and notice how the cords move; then to say *ē*, which will bring the cords tightly together, and in some instances cause the tongue to rise so as to render the view impossible. If this is the case, ask the patient to say $\overline{he}$, in as high a tone as possible. This elevates the epiglottis, and usually allows a good view of the cords. It will sometimes happen, in spite of all that can be done, that retching and vomiting are brought about, and the examination may have to be given up before a satisfactory view is obtained. In this case, for the next examination spray the pharynx, and so far as possible the larynx, with a three or four per cent. solution of cocaine. Again, the epiglottis is sometimes in the way, in which case it can be drawn forward with a laryngeal probe or applicator. For a good examination it is requisite that the mirror be properly placed against the uvula so as to press it firmly backwards rather than to tickle it. This completes the routine examination so far as the adult is concerned, and we are ready to take up the treatment of whatever we may have discovered to be out of the way.

As considerable practice is required to make a very satisfactory laryngoscopic examination, it should be attempted whenever opportunity offers. In viewing the larynx, and especially when making applications, it should be borne in mind that the plane of all the structures visible in the mirror is not the same, the free edge of the cords being nearly an inch below the ary-epiglottic fold, although appearing in the mirror as approximately on the same level. Owing to the rays of light from the front of the larynx striking upon the upper or anterior portion of the mirror while those from the back strike upon the lower or posterior portion, the laryngeal image or picture appears in the mirror as reversed antero-posteriorly, though not sidewise, the rights and lefts remaining unchanged. This is a source of difficulty to all beginners in making topical applications, and can be only overcome by much practice. If according to the mirror the applicator appears to need to go forward, what is really required is for it to go backward. (See Fig. 30.) A laryngeal phantom will aid in acquiring the necessary skill.

If after the ordinary examination of the nose more room is needed for observation, some cocaine muriate, two to four per cent., can be sprayed over the surface, or placed against any particular part on a little

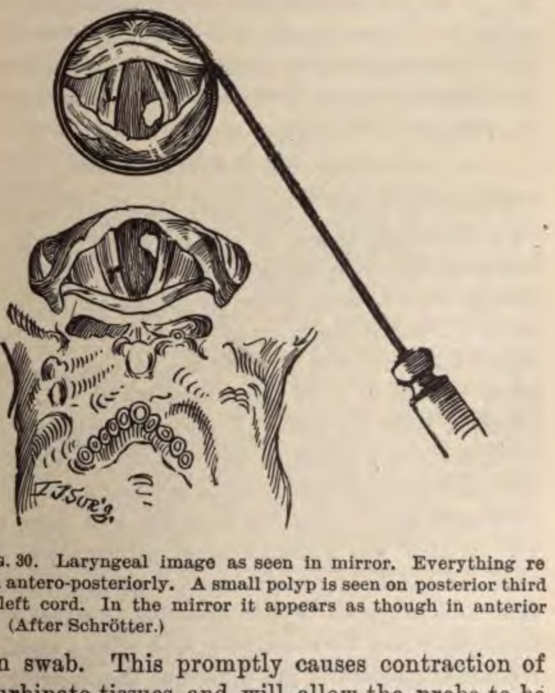

FIG. 30. Laryngeal image as seen in mirror. Everything reversed antero-posteriorly. A small polyp is seen on posterior third of the left cord. In the mirror it appears as though in anterior third. (After Schrötter.)

cotton swab. This promptly causes contraction of the turbinate tissues, and will allow the probe to be used without pain for the more thorough examination of the parts. The astringent effect of the cocaine soon passes off, leaving behind in many persons a feeling as though there were an acute head cold, with dilatation of the bloodvessels and some interference with breathing, hence, cocaine is not to be applied as a routine measure, but only where its aid is needed for diagnosis and treatment. When cocaine is used in the pharynx or naso-pharynx, it produces the sensation of a foreign body, or as is often expressed, as though the throat were "filled up." This sensation passes away in a short time, and the patient should be informed of the liability of its occurrence. Occasionally, some timid person will be afraid to have cocaine used, in which case it should be explained to him that the amount is so small that no harm can result.

EXAMINATION OF CHILDREN.

The young child is naturally afraid of the doctor; he is especially afraid of the nose and throat man, whose table, it may be, is covered with a multitude of strange instruments, every one of which he fears. I am in the habit of getting all the information possible before the child sees any portion of that part of the room in which I do my work, which is carefully screened from the rest. I place him before a good light, without a forehead mirror on my head, and look into his nose and throat, using my finger for a tongue depressor, and frequently showing him how to use his; in this way a good deal of information can be obtained before any instrument is used. I hear him talk, and judge as to the presence of nasal obstruction; have him blow his nose, and with a small nasal speculum frequently get a view of the interior of the nose. By this time he has got over his first fright, and if it is desired to carry the examination further, the child is usually willing to sit down in the chair or on the assistant's lap, and have the light thrown into his nose and throat.

In case adenoids are suspected, I always prefer to demonstrate the condition with the finger in the naso-pharynx, notwithstanding the objections which are urged against this mode of procedure. This is done as the very last act of the examination. Although in most instances we are able sufficiently well to judge of the presence or absence of adenoids, yet the finger in the naso-pharynx is confirmatory as to their extent, size, their relation to the pharynx itself, and the amount of obstruction which they cause. The child is placed in the lap of the nurse, while the mother or other attendant holds his hands. The right forefinger with the exception of the tip is wrapped in a small towel, and in the other hand is a glass tongue depressor, which is put into the mouth at the angle of the jaw so as to prevent the possibility of biting the examiner's hand. The child is told that you are going to feel in the throat. The finger, *previously thoroughly cleaned,* and covered with a rubber finger cot, is passed in on the tongue, which is depressed; the uvula felt for, and the finger passed up underneath it into the naso-pharynx, and quickly swept over its whole area, feeling in every part from one Eustachian orifice to the other, when it is quickly withdrawn. If the adenoids are very abundant there will be a little bleeding. The child is told to blow his nose, and usually cries a little. There is no reaction, and the slight pain is more than compensated for by the information which the examiner has gleaned. Occasionally I find that no operation is necessary in a case in which I had previously supposed it would be, and again it is the other way. The slight bleeding which follows, and the stretching of the soft palate by the examiner's finger frequently produce more room and the child is immediately benefited by the examination. This subject will be considered more fully under the heading of adenoids.

In the case of a very young child, where a laryngoscopic examination is occasionally necessary, it will have to be firmly held in the vertical position by a good assistant, and even then a satisfactory examination of the larynx may be impossible, owing to the omega shape of the child's epiglottis. Fortunately, it is comparatively seldom that an examination of the larynx of a young child has to be made.

CHAPTER VI.

GENERAL PROGNOSIS AND THERAPEUTICS.

What are the results of the treatment of the affections of the nose and throat; are such curable? One of the regular questions asked by patients will be, "Doctor, can my catarrh be cured?" followed almost immediately by, "I don't suppose it can." The reason for this is doubtless the prevalent opinion that catarrhal affections are not curable. In answer to these queries we can truthfully say, that if the causes of the condition can be reached the catarrh is usually curable.

The results of treatment of affections of the upper air tract, if the causes are carefully looked into and an accurate diagnosis made, will be found as satisfactory, if not more so, than those of any other part of the body. Almost all of the region can be brought under the direct inspection of the eye, and the application of remedies to the parts does not offer any insuperable difficulty. In the absence of malignant or serious constitutional disease, nearly all the conditions of which patients complain are amenable to treatment, and a very large proportion of cures is possible. Even those diseases such as atrophic rhinitis, where the mucous membrane is more or less destroyed, and where an absolute cure is out of the question, are nevertheless susceptible of great improvement, an amount sufficient, at least, to more than compensate for the time and trouble of the treatment.

All attempts at treatment should have for their ultimate purpose the restoration of the normal physiological function of the part. We should be able in every case to promise the patient that the treatment will not make him worse, while the probabilities are all in favor of great relief; in a word, the prognosis of these affections may be considered good.

GENERAL THERAPEUTICS.

In the nose and throat, as in any other part of the body, the effects of constitutional diseases are evident. Syphilis has its group of manifestations in the nose, the pharynx and the larynx. The sufferer from gout has the peculiar pharynx, irregular, dry, red, with not infrequently little elevations showing the presence of the gouty deposit. The rheumatic diathesis shows itself in the larynx and pharynx, especially in the latter, and the sufferer will have his peculiar throat difficulty, though in many cases there will be no visible manifestations of any peculiarity directly traceable to the disease. If, however, the rheumatism continues long enough, the pharynx will show changes which will suggest its presence to the trained observer. Here the treatment should be general rather than local; and in the treatment of all affections the value and necessity of constitutional measures should not be disassociated from what the eye sees on examination of the part. The body as a whole should be treated rather than simply that portion of which the patient may complain. As J. Solis Cohen has said: "We should be physicians, not mechanicians." Careful attention to the digestion, the functions of the liver and the kidneys, will clear up many a troublesome throat. All the processes of elimination must be properly performed; one of the most valuable remedies in this direction is water, of which most of our patients take too little.

Many persons will complain of pain in the throat when no visible manifestations of trouble can be found. This may be of neurasthenic character, in which case local treatment will be of value for its moral effect only, but it may be necessary from this standpoint; at the same time, search should be made for a more definite cause of the trouble, and the proper treatment applied. Bad habits should be looked after, and their causative influence impressed upon the patient. Among these, the free use of tobacco and alcohol, the excessive use of hot, highly spiced food, the living in an overheated, insufficiently moist atmosphere, and the paying of too little attention to keeping the skin in good, physiological condition, merit special attention.

In order to keep the nose free of excessive secretion and dust nature has provided for using the expiratory current of air by forcibly blowing it through the nasal chambers. Observation readily shows that many people do not know how to blow the nose properly, but attempt to blow both sides at once, instead of closing one nostril and putting all the force on to the other. Children especially should be taught how to blow the nose, and the attention of parents must be called to this.

Among the common therapeutic procedures the use of gargles may be mentioned first. They are universally used, and in most instances are of comparatively little value. In the process of gargling the naso-pharynx is cut off from the pharynx, and the liquid comes in contact with only the base of the tongue, a portion of the pharyngeal wall, the opposing surfaces of the tonsils and their pillars. This particular region can be reached to a certain extent by a properly performed act of gargling, but nothing in the larynx can be reached in this way. With an irritable, not acute, pharyngitis, the gargle may be of service. For this purpose the mild astringents dissolved in hot water seem to be most effective.

Sprays have enjoyed and do enjoy very general use. They are of two kinds: solutions with the ingredients dissolved in water, and those dissolved in oil; of the latter petroleum oil, or liquid vaseline, is the one most employed, for the reason that it does not become rancid and is not irritating. Both kinds of sprays, with the aid of suitable tips on the end of the apparatus used, can be made to reach the whole tract from nose to larynx, and are among our most valuable means of applying remedies directly to the spot affected. The strength of the solutions should not be such as to cause pain or smarting, and in general it may be stated that owing to the exquisite acuteness of sensation of the mucous membrane, especially that of the nose and larynx, it is much better to err on the side of applying too weak solutions than too strong. As a rule, the patient should feel better after a treatment rather than worse, with perhaps the single exception of cases in which it is necessary to use nitrate of silver in spray or on swab. For the past few years, oil sprays have been pretty generally recommended, and a variety of prepared solutions of more or less antiseptic value are sold by various chemists. While they frequently produce a certain amount of temporary relief, it must not be forgotten that the natural lubricant of the mucous membrane of this region is not oil, but a thin alkaline mucus, and that the long continued use of oil sprays is probably deleterious, and may intensify or perpetuate the condition it is intended to cure. I find myself ordering these sprays for home use less and less each succeeding year.

The alkaline sprays in which the alkalinity is due principally to the chloride of sodium and bicarbonate of soda have great value in the removal of mucus from the nose when used under from fifteen to twenty pounds air pressure, and even the less pressure of the hand atomizer will produce fairly good results. When giving hand atomizers to patients, they should be taught how to employ them. The average patient will hold an atomizer as though the nasal passage led directly to the eye, and then will complain because the atomized fluid does not reach the place desired. He should be told that the floor of the nose is on a level with the roof of the mouth, and that the atomizer should be held with its tip parallel with the roof of the mouth. Even the use of sprays should not be allowed to become routine; they should be resorted to for cleansing when their need is present, and discarded at other times. The natural function of the nose being to convey air, the use of fluids should be with the end in view of restoring the mucous membrane to its natural condition.

Besides the sprays, I am in the habit of employing both the douche and the syringe in the nose. The use of the douche is readily learned, and being devoid of any pressure, has no special risk, and allows a considerable quantity of warm alkaline fluid to penetrate the whole of the nasal cavity in a way that the small quantity of fluid propelled from the atomizer cannot do.

Objection has been made to the use of the syringe on account of the danger of the entrance of fluid into the middle ear. While this is a possible danger, practically it amounts to very little, and after several years of daily use of the nasal syringe, I do not recall to have had any trouble in the ear following its employment, except on one occasion, and a little more care would have avoided that. Where the nose is filled with mucus and crusts, there is no method for their removal which is as efficient and as little disagreeable to the patient as the forcible syringing of a considerable quantity of warm saline solution. The technique, while simple, is of some importance: the individual's head should be held over a dish, and the neck protected by a towel; the syringe should be of the push variety with a blunt tip; insert in the narrowest nostril first, the other not being closed, and while the patient is told not to swallow nor to breathe, the piston is pushed inward and the fluid comes out of the other nostril. The syringe is then withdrawn, and the patient told to blow gently through each nostril; then the process is repeated on the other side. When syringing from an open to a closed side the force should be less, and the procedure carried out more slowly than when syringing from the closed to the open side. As long as there is no hindrance to the outflow, there is little risk of forcing the fluid into the ears. Some patients have to be taught this procedure, and the first time it is used may get water into the throat, producing an attack of coughing; as a rule, it is accomplished without the slightest difficulty, and is always productive of a sense of relief to the individual. This is applicable not only to the chronic affections, but to the more acute ones, especially in the later stages of an acute cold where the amount of mucus is very excessive and difficult to remove. For home use, a soft rubber bulb-syringe or a small glass push-syringe can be employed. The proportion of saline in the fluid used should be such that the injected fluid is never irritating. Normal salt solution made by adding one-half teaspoonful of salt to a pint of water answers very well. Plain water is irritating. Many of the prepared solutions, if properly diluted, are very serviceable. Several forms of tablets easily dissolved to make a satisfactory solution are at hand, the original of which, known as Seiler's, is perhaps as good as any. I use the solution as warm as it can be comfortably borne, and rather less of the saline than is ordinarily recommended.

Heat and cold are sometimes applied, externally to the nose and throat, but have not a very extended field of usefulness, excepting the application of cold after operations on the nose, for the reduction of inflammation.

Massage is used in the nose, chiefly in cases of atrophic rhinitis, to stimulate the mucous membrane.

Powders are employed somewhat in the nose, and have been recommended for use in the larynx, where, however, they provoke coughing; they are a class of remedies of no special value in the nose and throat.

For special remedies, the use of which will be referred to under the various diseases in which they find application, and which are essential as a part of the working armamentarium, the following may be mentioned: The various astringents; nitrate of silver from two to twelve per cent., which can be used as a spray in about three per cent. solution (fifteen grains to the ounce), and for topical application up to twelve per cent.; argyrol, five to thirty per cent. in spray or topically; tannin in the form of tannate of glycerine, sixty grains of tannin to the ounce of glycerine; subsulphate of zinc, ten to thirty grains to the ounce of water. Alumnol, five per cent. solution, is a satisfactory form in which to use alum. Iodine combined with iodide of potassium and glycerine in varying strengths as follows:

Iodine	gr. viij to xij
Potass. iodide	gr. xxiv to xxxvi
Glycerine	℥ ss

and the same combined with ichthyol, are valuable as stimulants for sluggish mucous membranes. Peroxide of hydrogen is useful as a means of controlling hemorrhage, and can be employed in varying strengths up to fifteen volume solution.

When it is desirable to actually destroy tissue, the caustics come into use. The most valuable of these are the solid nitrate of silver fused on the tip of a probe, trichloracetic acid, and chromic acid. Trichloracetic acid is used in the form of crystals most satisfactorily by warming the bottle containing them in hot water or over the lamp flame, and then dipping the applicator, around the end of which a bit of absorbent cotton is tightly wound, into the melted crystals. After application a white eschar is left. Chromic acid is used fused on a probe in the following manner: the silver probe is heated in the lamp flame, next inserted in the bottle of crystals of chromic acid, some of which will adhere to its tip, then warmed over the lamp flame until the crystals begin to melt and flow down towards the end of the probe in the form of a little bead, when it is withdrawn. Care must be taken not to overheat or burn the crystals, otherwise they are reduced to the inert oxide. Chromic acid burns more deeply than the nitrate of silver or trichloracetic acid, is not followed by much reaction, and the slough comes away in about a week. When first applied it leaves a yellow line. If too much is used it may be neutralized by a saline solution. No after-treatment is necessary.

The galvano-cautery has been referred to in the section on armamentarium. The portion used consists of a pair of cautery wires with platinum tip. These are to be had in various shapes according to the part in which they are to be applied. The galvano-cautery is used for two purposes, for the stoppage of hemorrhage, for which the current is turned on sufficiently to bring the platinum tip to a red heat; and for caustic effect, when it is carried to a cherry heat bordering on white; but it is never employed with the current sufficient to give it a white glow. On account, however, of the amount of moisture in the parts and the consequent cooling of the tip, a slightly stronger current is usually turned on than would seem to be necessary. When used in the nose, carry the instrument while cold to the posterior portion of the part to be cauterized, then turning on the current slowly draw it forward. Do this as many times as may be needed. Do not hit the external nose in withdrawing, as pain is thereby produced, and a burn here is objectionable. The pain is slight if sufficient cocaine has been used, and there is no bleeding. The anterior portion of the nose is the most sensitive. An eschar is formed which looks a little like a croupous membrane. This comes away in a week to ten days, and healing is complete in three or four weeks. Care must be taken not to touch any part other than the one desired, and especially the opposing turbinate or septum, as the case may be, owing to the danger of the formation of bands or synechiæ in the healing process. Do not shut off the current until the cautery point is withdrawn from the tissue.

Lactic acid in 25 to 100 per cent. solution and paramono-chlorophenol 10 per cent. are used for tuberculosis in the larynx and pharynx.

For the production of anesthesia, cocaine is of the greatest value in from two to four per cent. solutions. It may be used as a spray or a topical application preceding the use of nitrate of silver or other pigments which produce pain, and in stronger solutions is applied directly to the parts on the swab to produce local anesthesia for operative purposes. For the latter, I usually employ twenty per cent. solution, and limit it entirely to the part to be operated upon. A ten per cent. solution of cocaine and ether, known as vapo-cocaine, and in general use among dentists, is of especial value for use in the nose preceding sawing operations, since it has a penetrating power very much greater than that of a watery solution of cocaine. The actual powdered cocaine may also be used, being carried to the part on the tip of a cotton applicator. Cocaine in two to four per cent. solutions can be applied hypodermically for operations on the tonsil, for exploring the antrum, or for operations on the septum, though for the latter it will seldom be necessary. When cocaine is sprayed into the nose it produces a feeling of roominess, owing to its power of shrinking the capillary blood supply, and on account of the relief which this gives, it has come to be employed in hay fever and conditions of vasomotor paresis. The habit is sometime induced thereby, and on account of this danger it should be the rule of every physician never to prescribe cocaine for the patient's use, but to keep it entirely within his own hands.

Within a few years a valuable adjunct to cocaine in all operative procedures in the nose and throat has appeared in the form of powdered suprarenal capsules. When applied locally in a watery extract by means of a spray or on pledgets of cotton, it produces almost immediately an anemia of the tissues more marked than that of cocaine, and intensifies the anesthetic effect of cocaine. A solution is made by mixing thoroughly twenty grains of the powdered suprarenal gland in a drachm of boiling water and filtering. It must be made fresh each time owing to its rapid decomposition. I have found that a little bit of the powder itself picked up on a loosely wound cotton pledget and rubbed over the part is equally efficient, and requires no time to prepare. Its active principle, adrenalin, has recently been isolated and can now be had in the form of a solution of adrenalin chloride, 1-1000.

With the aid of cocaine and suprarenal capsule, tissues can be made practically absolutely anesthetic and the field of operation free from blood. This is a tremendous advantage over anesthesia in which the vision is obscured by a considerable amount of blood, which is very much in the way. The constringed bloodvessels later relax and secondary hemorrhage may occur; provision must be made for this even though it does not always take place. Cocaine intoxication seldom follows the use of this drug, and when it does so its duration is a few hours only; its treatment must depend upon the symptoms, which are very varied; in several years' experience I have witnessed it but a few times. Whenever possible it is preferable to operate with local rather than general anesthesia on account of the better light obtainable, and the lessened danger of blood getting down into the larynx and choking the patient. The anesthetic effect of cocaine lasts from twenty to thirty minutes, and if it is not maintained long enough during the operation, more cocaine is readily applied.

Eucaine is said to be less toxic than cocaine; its anesthetic effect comes on more slowly and is not quite so pronounced as that of cocaine. It is more irritating when first applied.

The galvanic electric current has many uses, especially for chronic pharyngitis and laryngitis, in which it seems to be a valuable help in capillary congestions in restoring the natural nervous control of the minute bloodvessels, and stimulating the vaso-motor structures, which are paralyzed in many, if not in most, congested conditions.

There are a large number of lozenges which have more or less value in affections of the nose and throat. Among them may be mentioned guaiac in the form of the gum mixed with sugar, red gum, chloride of ammonium, and balsam of tolu. The well known tonsillitis tablet containing

Tinct. aconite 1-5 m.
Red iodide of mercury 1-100 gr.
Tinct. bellad. 1-10 m.
Tinct. bryony 1-10 m.

is of great use in the early stages of acute affections.

Of general remedies, potassium iodide, quinine, iron, nux vomica and its alkaloid, the hypophosphites, the preparations of codeia for the relief of cough, and the various laxatives are those most commonly used in these affections.

OPERATIONS.

Unlike almost all other parts of the body, the field of operation in the nose and throat cannot be made aseptic, nor is it desirable to attempt this, since to do so will require more or less destruction of the mucous membrane, and thereby very much hinder and delay the healing process. With the exception of the vibrissæ at the entrance of the nose, few pathogenic bacteria are present, and the risk of infection here is comparatively slight. The important thing for the operator to bear in mind is to have his instruments and everything to be introduced into the nose and throat absolutely sterile. On account of the difficulty of thoroughly cleaning laryngeal mirrors, as boiling quickly spoils them, separate mirrors should be provided for syphilitic and tubercular patients. I put them in boiling water for a moment whenever there is any reason to suspect infection; and the surfaces front and back are always carefully cleansed after each using. The mirrors can be immersed for a short time in a strong solution of lysol, which must then be rinsed off. The laryngeal mirror can be prevented from condensing moisture if the surface be covered with a thin layer of hard soap and then wiped clean.

Cleanse the field of operation by mild saline solutions rather than with strong antiseptics, since the latter injure the mucous membrane and hinder its powers of repair. Wounds in this region seldom heal by first intention, but by granulation, hence the power of repair should be as good as possible. Since all wounds heal by secondary intention, it is evident that nature will quickly cover them with a protective, which under most circumstances should be left alone, and the temptation to poke it every day with the probe or cotton be restricted. At the time of operation the bleeding should be stopped as thoroughly as possible and the surface then let alone.

Tampons are to be used in the nose only when necessary, on account of the real or suspected danger of bleeding, since they are very uncomfortable to wear, and their removal is apt to be painful. If too large they cause headache, pressure on the tear ducts, red eyes, acute conjunctivitis, and in cases in which putrid secretion is present, may produce constitutional disturbances, by damming up this secretion; hence they are to be got along without whenever possible. In most cases of nasal operations gauze is to be preferred to cotton as a tampon. A small piece of cotton put into the entrance of the nose, if the person is kept as still as possible, will answer, and in most instances there will be comparatively little bleeding. The patient should be instructed to notify the physician at once if bleeding should occur. Cases in which the tampon is absolutely necessary will be considered under the individual operations.

CHAPTER VII.

ACUTE INFLAMMATIONS OF THE MUCOUS MEMBRANE.

ACUTE RHINITIS.

The mucous membrane of the upper air tract is especially liable to acute inflammations, many of which become the starting point for the more chronic catarrhal affections which are embraced under the generic name of "catarrh". Acute rhinitis, or an acute cold in the head, is the term used when the nose alone is affected. Its etiology and symptomatology are too well known to require more than brief mention. Its most common cause is perhaps the chilling of some portion of the body. Bodily fatigue, exposure to winds, and overheated rooms are all prolific causes. It is an accompaniment of influenza, all of the contagious diseases, and hay fever; it may also be caused by certain drugs, as iodide potassium.

Symptoms.—The individual is usually conscious of its onset. There is first a sense of chilliness, then stuffiness in the head and accessory sinuses, the turbinate tissues become engorged, nasal breathing is difficult, the sense of smell becomes diminished, and the voice acquires a thick, so-called nasal tone. On examination the mucous membrane will be found swollen, and the turbinates perhaps in contact with the septum. There are three stages: the first of capillary engorgement, followed by a copious serous discharge, becoming sero-purulent later and perhaps finally purulent, unless, as is usually the case, recovery takes place in the sero-purulent stage.

Treatment.—Untreated it gets well in from five to fourteen days, but if taken at the very start it can usually be aborted. Aconite in small divided doses for several hours at the onset of the attack, a dose of morphine or Dover's powder, a hot foot bath on going to bed, a laxative, and quinine or salicylate of soda, are all useful as abortive remedies. Cocaine is useless at any stage; its temporary relief of the congestion being followed by more engorgement than ever. In the secondary stage, namely that of excessive secretion, various so-called coryza remedies are of especial use; those containing camphor, quinine, atropia and a small dose of morphia are the best. The only local treatment which is at all effective is the spraying, syringing, or douching of the nostrils with a weak alkaline solution as warm as can be borne. If the turgescence of the turbinate tissues continues during the stage of convalescence, so that breathing is still difficult, touching the surfaces from behind forwards with trichloracetic acid or chromic acid is of use and favors the return of the tissue to its normal condition.

Involvement of Neighboring Structures.—The mucous membrane of the accessory sinuses, especially the frontal, is frequently involved, and this accounts for the intense headache and sense of fulness in the forehead and around the eyes, which are so often accompaniments of acute rhinitis. The irritating secretion sometimes causes an erythema at the entrance of the nose.

The attack may subside without involvement of the other portions of the air tract; it frequently, however, passes downwards, involving the mucous membrane of the pharynx, producing an acute pharyngitis, with mild inflammation of the tonsils and arches, causing some difficulty in swallowing, but not necessarily a true tonsillitis. The mucous membrane of the pharynx will be found reddened and somewhat swollen.

Recovery should be complete, although the sense of smell may remain impaired for some time and the congestion of the Eustachian tube is frequently slow to disappear, and may even result in deafness.

ACUTE PHARYNGITIS.

In case the pharynx, as sometimes happens, is the primary point of attack, abortive remedies the same as recommended for the nose may be used. There is frequently considerable pain, and mild astringent remedies and lozenges containing gum guaiac, red gum or gelatin will be found of service.

ACUTE LARYNGITIS.

The natural tendency of the inflammation of the mucous membrane is steadily downwards, and not infrequently as the nasal and pharyngeal symptoms become better, the larynx becomes involved, or as in the case of the two preceding, it may be the primary point of attack. The etiology is the same.

Symptoms.—The voice becomes thick, hoarse, and it may be absolutely aphonic. A cough of a harsh, dry, rasping character is almost invariably present. Examination with the mirror shows the laryngeal mucous membrane swollen, especially that of the false cords and the interarytenoid space, so that frequently the cords do not properly approximate. In color the cords vary from a slight pink to a livid hue. Abortive treatment does not seem to be so effective when a laryngitis is the primary condition, nor is spontaneous recovery as rapid. If the tendency of the extension of the inflammation is still downwards, an acute tracheitis, and not infrequently bronchitis, follows. Sooner or later the trachea will almost invariably be involved, and inflammation of this may remain after the hoarseness has disappeared.

Treatment.—Abortive treatment is to be tried as before, if the case can be seen early, and the patient will be materially helped by the inhalation of soothing vapors such as compound tincture of benzoin vaporized with boiling water, and oil sprays. If, as is usually the case, relief is sought after the attack has been in progress one or more days, by which time the inflammation has become somewhat subacute, very much can be done to relieve the hoarseness and cough by spraying the larynx with 1-10,000 adrenalin chloride solution, then with five per cent. alumnol followed by an oil spray. Cocainizing the larynx and then spraying with two to three per cent. nitrate of silver, while productive at the moment of considerable discomfort, materially hastens the progress towards recovery. The use of the galvanic current from eight to ten milliamperes, the sponge electrode being held on each side of the larynx and the current continued for about ten minutes, helps the effect of the preceding remedies, as the galvanic current appears to influence the nerve supply of the finer bloodvessels and to stimulate the vaso-constrictors so that the congestion rapidly disappears. For the troublesome cough, preparations of ammonia, either in the form of muriate or the hypophosphite of ammonium, are especially serviceable; and for the rasping, tickling cough I have found no sedative so valuable as codeia in doses of from 1-25 to 1-5 a grain combined with muriate of ammonia, and repeated as may be needed.

ACUTE INFLAMMATIONS.

Repeated attacks of inflammation finally bring about a condition which may be termed chronic. These affections are best considered by regions, though it by no means follows that only one portion of the upper air tract is affected; since chronic rhinitis, chronic pharyngitis, and chronic laryngitis may either coexist or be separately present.

CHAPTER VIII.

CHRONIC INFLAMMATIONS.

CHRONIC HYPERTROPHIC RHINITIS.

(Chronic Nasal Catarrh.)

This term includes hypertrophy of the mucous membrane covering the turbinates, and true bony enlargement of the inferior and middle turbinates, causing disturbances in the functions of the mucous membrane, of all degrees of severity.

Etiology.—Its causes are many: repeated head colds; the influence of various occupations, especially those in which dust and irritating gases are inhaled; defective nutrition; changeable climate; winds; variations in the degree of humidity; irritations arising from faulty development; constitutional conditions such as gout, rheumatism, syphilis and tuberculosis; adenoid growths in the naso-pharynx; deviations and new-growths, bony and otherwise, of the septum; and in general anything which interferes with the proper performance of the physiological function of the nose.

Symptoms.—On examination the secretion will be thicker than normal, apparently increased in amount, though probably really diminished, and the mucous membrane itself instead of being of its normal pink shade will have a bluish, congested appearance. Both sides may be equally affected, or one much more than the other, depending on peculiarities of development; the two nostrils are seldom exact counterparts of each other.

The absolute amount of change varies all the way from a cellular infiltration of the erectile tissue underneath the mucous membrane and of the mucous membrane itself, to a true fibrous inflammation; in the latter case the thickening is real and not merely apparent. The simple cellular infiltration is accompanied with some engorgement of the erectile tissues, yielding readily, however, to the probe. While the process is going on to the fibrous stage, the surface of the turbinate (and the turbinate most frequently affected in this condition is the inferior) may be somewhat irregular in outline, presenting various aspects from simple enlargement to a mulberry-like appearance, even to changes which suggest a myxomatous growth. The posterior portion of the inferior turbinate may be enlarged to such an extent as to interfere with breathing; the anterior and middle portions may remain constantly in contact with the septum; and the septum itself may have cushion-like swellings, especially posteriorly. It is this class of cases, with its multiform variations, which constitutes the bulk of those patients who apply for treatment for what they call "catarrh."

While the inferior turbinate is the portion most frequently and earliest involved—as it is most abundantly supplied with erectile tissue—the middle turbinate may also be affected; its mucous membrane becomes thickened, comes in contact with the septum, and degenerative changes to a greater or less extent occur in the structure of the bone itself. The middle turbinate, being really a portion of the ethmoid, has a very spongy structure, as well as more or less erectile tissue in its anterior inferior portion.

The secretion varies from a thin, abundant to a thick, scanty, easily-drying secretion, with frequently considerable obstruction to breathing; the nasopharynx may be covered with a tenacious mucus; the patient will complain of "dropping in the throat," especially in the morning, and will state that the secretions are hard to remove, requiring more or less retching. There may be some frontal headache and a general lack of tone. The pharynx will be dry; the larynx may be involved and the voice hoarse, with perhaps an irritable cough, solely on account of interference with nasal breathing. The sense of smell is apt to be disturbed, and there may be secondary affections of the eye and ear. This condition while not necessarily causative is frequently an accompaniment of hay fever and asthma.

Diagnosis.—The diagnosis is made by inspection before and after careful cleansing of the whole area by the spray or the moistened bit of cotton on the applicator. The most valuable means of diagnosis is the probe, used first before cocainizing and again afterwards. The tip of a long silver probe can be carried to all parts which are visible, without pain to the patient, provided it is done with care. On pressing it against the turbinate tissue, if a simple congestion or hyperemia results, the probe may be pressed into it, usually causing shrinking, which shrinkage is maintained for a time, or if there is no shrinking it is readily pressed to the bone; whereas, on the other hand, in a true hypertrophy of the inferior turbinate it may be pressed to the bone and will indent itself as though pressed against a mass of putty, and no sooner is the pressure removed than the turbinate feels as full as before. Furthermore, the sense of touch gives considerable information as to the degree of thickening of the mucous membrane and of the underlying structures, and in what stage, from cellular infiltration to fibrosis, the transition is. The probe will also give valuable information with reference to the presence or absence of adhesions between the inferior and middle turbinates; in the septum as to whether there is bare bone to be felt anywhere, and as to the condition of the mucous membrane of the septum. The post-nasal examination will show the presence or absence of hypertrophy of the posterior end of the inferior turbinate, and the condition of the mucous membrane with reference to color and secretion.

Having examined so far without cocaine, the whole interior surface of the nose is now sprayed with four per cent. solution of cocaine, and the changes carefully observed, since these are the index to the treatment. If the tissue shrinks rapidly under cocaine, the degenerative process has not progressed far, and may be in a stage of chronic hyperemia rather than true hypertrophy. If, however, the cocaine spray makes no difference with the swollen tissues, some cocaine may now be rubbed on the turbinate tissues themselves. Rubbing with the cocaine-moistened cotton pledget will cause the turbinate to shrink as much as possible. Observation will then determine as to what is best in the way of remedial agents, since the relief afforded by the cocaine is only temporary.

Treatment.—If the shrinking with the cocaine is reasonably quick and fairly effective, relief may be had by rubbing with one of the milder caustics along the middle of the turbinate tissue throughout its whole extent from before backwards or from behind forwards. Trichloracetic acid to both turbinates, if both are affected, or to the inferior alone, followed by spraying the whole nostril with an astringent such as alumnol, and repeated a number of times, is very effective. In the cases following the grippe I have usually found this to be sufficient. If, however, some evidence of true thickening has begun and the shrinking under cocaine is less rapid, then chromic acid is much more efficient; fused on the probe in the manner previously described, it is used over the same portion of the turbinate tissue, and repeated as may be needed at intervals of about five days. After using it is usually desirable to spray or to pass in on an applicator some saline solution, since it is difficult to limit exactly the action of the acid.

When the contraction under the cocaine spray has been slight, and has required forcible rubbing into the tissue to produce satisfactory contraction, none of the chemical caustics will be found efficient, and in these cases either a portion of the turbinate tissue must be entirely removed with snare or saw or else the galvano-cautery must be used. Cases in which spurs or deviations of the septum are the exciting causes are not here considered; for the purpose of this chapter it is assumed that the septum is practically normal.

In case there is a marked hypertrophy of the posterior end of the inferior turbinate, around which a snare can be thrown, the snaring off of this is the best thing to do. The snare should be armed with No. 5 piano wire, which is stiff enough so that the loop can be made to suit, and then introduced where required. Make the loop large enough to lay over the place before tightening. Snaring can be done without severe pain, and if the snare wire is slowly tightened and held a short time after being made as tight as possible, and then twisted so as to get some torsion of the severed vessels, the hemorrhage will not usually be extreme, although in exceptional cases the bleeding may be considerable and require tamponing to control it. When this is the case, a thin strip of gauze previously soaked in a mixture of antiseptic oil and peroxide of hydrogen and loosely laid in place will control the bleeding. There is very likely to be some oozing for a day or two. The galvano-cautery snare can also be used; there is no bleeding from this, but owing to the difficulty of ascertaining exactly how much heat is applied when the part to be snared is so far back as to preclude the chance of seeing, I prefer the cold wire snare.

When the hypertrophy in the anterior portion is nodular so that it can be removed with the snare, either the cold wire or the galvano-cautery snare can be used. When the hypertrophy is perfectly smooth, and the snare is out of the question, the galvano-cautery will usually be found to be the best remedy. Cocainize thoroughly, and use a tip which is fine pointed like a needle, and not a flat one, introduce as far back as possible with the current turned off, and drawing forwards, cauterize the middle of the inferior turbinate as far forward as is necessary, taking especial care not to touch the skin of the nose with the burner, and to remove the tip from the part cauterized before shutting off the current, otherwise bleeding will result. Do this two or three times at intervals of two weeks until it is evident that the part has been burned down to the underlying bone. When the scab comes away, which it will do in a week to ten days, the turbinate will show a hollow, and the hypertrophied tissue will have become bound down to the bone. The reason that a broad platinum tip is not used, is that the width of the galvano-cautery burn should be as narrow as possible, since it is desired to destroy only a little of the turbinate tissue and mucous membrane, as its physiological function is always to be borne in mind, and we are not to remove or destroy any more tissue than is absolutely necessary.

Instead of lining the mucous membrane superficially with the galvano-cautery, the burner may be introduced anteriorly underneath the mucous membrane and carried backwards, making a cicatrix without destroying the superficial mucous membrane. Since, however, a burn always implies the death of a part, the reaction will be less under the former method, as the resulting slough is then readily cast off.

The galvano-cautery destroys a certain amount of tissue; to avoid this there is another operation, which, while more difficult to perform in certain cases, seems to be productive of better and more permanent results. This is done in the following manner: Introduce a long, thin, fine tooth saw underneath the free or presenting third of the under surface of the inferior turbinate. Saw slightly diagonally upwards and towards the septum, so as to remove as small a portion of the presenting edge of the bone as possible, and to emerge a little above the middle of the convex free surface directly opposite the septum. Remove the saw, and cut off any portion not completely severed with the snare or scissors. This operation produces a clean wound, which readily heals, removes the redundant portion, furnishes an abundant amount of room in the nostril, does not destroy any amount of physiologically active tissue, and leaves a practically normal and much smaller turbinate. Some experience is required to do this properly, and the bleeding is very considerable, so that tamponing will be necessary in every case. I have only exceptionally performed it. For most cases the other methods will be found sufficient, and if the galvano-cautery is properly used, its results will be satisfactory.

The spokeshave, which has been advocated as a means of removing redundant turbinate tissue, and was at one time used to remove the whole of the inferior turbinate, is mentioned only to condemn absolutely.

Middle Turbinate.—In case the middle turbinate is affected, I am not very much in favor of using the galvano-cautery, because the reaction here is apt to be greater, and the risk of venous absorption increased. Mild astringents can be tried, but if these prove insufficient, and the middle turbinate is pressing against the septum, giving rise to sneezing, interference with breathing and headache, and preventing proper ventilation of the accessory sinuses, the anterior end had better be removed. Its shape is such that it is easily snared, and in many cases the cold wire snare is all that is needed. In others, the Teat or Myles' nasal cutting forceps can be used to advantage. Thoroughly anesthetize with cocaine and suprarenal capsule; transfix the center of the portion to be removed with the forceps, and then snare away the portion remaining on each side. The bleeding is apt to be profuse, and it is safer to tampon in all cases, unless the patient is going to be close at hand for some hours.

After all operations where bleeding is likely to occur, the patient should be kept in the physician's office a sufficient length of time for the effect of the cocaine, suprarenal capsule or other hemostatics to disappear, and not allowed to go home without a tampon if there is any danger of recurrence of bleeding. When, however, there is no likelihood of bleeding, the comfort of the individual is much greater without the tampon.

After-treatment.— The after-treatment of these conditions merits consideration. After trichloracetic and chromic acid none is required. The slough of the galvano-cautery will come away in a week to ten days, and there will be complete healing in two or three weeks. If necessary, the galvano-cautery can be reapplied at the end of two weeks. I do not favor doing it sooner; nor am I in favor of doing any severe operative measure, such as the galvano-cautery or any cutting operation on both nostrils at once, but prefer to wait until healing is very nearly complete on the first before touching the second nostril, as there is always more or less reaction. This does not apply to trichloracetic or chromic acid. The subsequent treatment after the cutting operations is but slight. Keep the nose clean, remembering that nature is going to cover the cut surfaces with a protective which is best left alone for a while. Daily cleansing, but not daily poking, will be a comfort to the patient. At the end of a week, too exuberant production of granulation tissue and the formation of adhesions must be guarded against. The snare will remove any excess of granulation tissue, and if the operation was properly done there will be little liability of adhesions. In the nose one must always guard against having two opposing raw surfaces, since they always tend to unite.

In case the tampon has been used, its removal is a matter of some concern to the patient, since if carelessly done it is not only painful but may set up considerable bleeding. Soften thoroughly with warm saline solution syringed into the nose, and then remove very gradually. Mild astringent sprays and careful consideration in the removal of the causes which originally led to the trouble constitute the further treatment.

Treatment—Mild Conditions.—When examination shows no marked abnormality of structure or mechanical conditions to be corrected, and the process has not caused any considerable thickening, simple mild measures may suffice. Cleansing the nose with douche or syringe, the daily home use of a mild warm alkaline solution, care to keep the nose clean, the correcting of any constitutional condition which may be causative, and looking after the condition of stomach and excretions, may be all that is needed. For local applications use the ichthyol-iodine compound previously mentioned. Five per cent. alumnol, ten per cent. argyrol, three per cent. nitrate of silver, or tannate of glycerine, at intervals of a few days, answer very satisfactorily as astringents. At the conclusion of a treatment spray the surface with some stimulating oil, but do not order for the patient to use every day at home, for reasons previously stated.

Before using nitrate of silver cocainize the surfaces. Many patients need a good general tonic. If secretion is very dry, a small dose of iodide potassium, one to three grains three times a day or syr. hydriodic acid to stimulate glandular secretion, is a valuable adjunct to any medicine which may be given.

CHRONIC NASO-PHARYNGITIS.

(Chronic Postnasal Catarrh.

This term is significant of a condition of chronic inflammation of the mucous membrane of the nasopharynx characterized by an altered secretion, thick slimy, tenacious, and removed with difficulty. The patient will complain of a "dropping in the throat." The phrase is expressive of the discomfort which results from this condition. It is always stated as being worse in the morning, since after several hours of sleep there is a considerable quantity of retained secretion which is removed by hemming and hawking, and by forcible blowing of the nostril. This form of catarrh is of every grade of severity from a slight inflammation to one of considerable degree, at first producing hypertrophy, and later, may be followed by atrophic changes.

Etiology.—It is dependent to a great degree upon the same causes that are productive of hypertrophic rhinitis and frequently coexists with that. Anything that interferes with nose breathing is also a cause. In young children enlargement of the pharyngeal tonsil, or adenoids, will be found to be the most frequent cause. Inflammation in the sphenoidal sinus and the posterior ethmoidal cells may also be causative; this should be borne in mind as a possibility.

Examination with the post-nasal mirror will show the mucous membrane to be of varying hue, red rather than its normal pink, and covered with more or less slimy secretion. Frequently this stringy mucus is visible from below the uvula and the arches of the palate.

Prognosis.—Patients with this condition are almost invariably helpable. It is, however, doubtful whether the mucous membrane can be perfectly restored if the conditions which have brought about the naso-pharyngitis are of long standing or are not remediable. It can always be stated with truth, however, that improvement is highly probable, although some time may be required for its accomplishment. Dr. J. E. Newcomb very aptly says: "As a rule, the longer they have complained, the more quickly they seem to think they can be cured."

Treatment.—This consists in the removal, so far as possible, of the cause, together with cleansing measures, such as syringing with the post-nasal syringe, using a mild alkaline solution, and the use of stimulating medicaments, such as the preparations of ichthyol, iodine, glycerine, and many others which are stimulating and mildly astringent. Four per cent. solution of silver nitrate applied on a cotton swab is very effective in the hypertrophic stage. The following makes a good application when there is a tendency to atrophic changes:

Iodine,	gr. v.
Potass. iodide,	gr xv.
Acid carbolic,	m. ii.
Glycerine,	oz. i.

If, for any reason, the post-nasal syringe is not available, a rubber catheter can be passed along the floor of the nose and then the post-nasal space easily irrigated with a bulb syringe, the tip of which engages the end of the catheter. A tablespoon each of chloride of sodium, biborate of sodium and bicarbonate of sodium in a pint of warm water makes a cheap and satisfactory cleansing solution. Always use as warm as is well borne. The douche cup is also reasonably efficient, but not so much so as the preceding.

The general hygienic condition of the patient must also be carefully looked after. Potassium iodide in a small dose, one to three grains, is of value as a stimulant to glandular activity, since the amount of material poured out is relatively diminished. The object of treatment should be to stimulate glandular activity, keep the parts clean, and render the secretion more fluid, so that it will not be retained on the surface of the mucous membrane.

Do not use the actual cautery in the naso-pharynx, as its disadvantages are greater than its advantages.

For post nasal syringing a hard rubber syringe with a curved tip and numerous small outlets instead of one large one will be found the most efficient. When applying remedies on the post-nasal applicator always ask the patient to try to breathe through the nose, as this relaxes the uvula and renders comparatively easy what is always very disagreeable and sometimes painful. Care and patience are necessary. Not infrequently it can be done easier if the patient holds the tongue down while the operator draws the palate forward with the palate hook held in the left hand while the application is made with the right.

In chronic catarrh of the middle ear with implication of the mouth of the Eustachian tubes, the same condition is usually present; hence the need of treatment, since it is probably the most common cause of catarrhal affections of the middle ear.

CHRONIC PHARYNGITIS.

Chronic inflammation of the pharynx is characterized by a thickening of the mucous membrane and diminution in the glandular secretion, soon followed by a sense of dryness and discomfort, later by atrophy of some of the portions, with perhaps hypertrophy of others. On inspection the mucous membrane appears reddened, sometimes of a dark red beefy color in those who use alcoholics or tobacco to excess; it varies from this all the way to a grayish red. More or less viscid secretion may be found sticking to the mucous membrane, or on account of the constant hawking this may not be visible. The bloodvessels are frequently prominent and injected. The membrane appears dryer than normal on account of the altered character of the mucous secretion.

Etiology.—This is much the same as that of the two preceding affections, and is principally due to mouth breathing, and the irritation of dust which has been breathed in through the mouth. Aside from this, anything that is irritating, such as hot, highly spiced food, and the excessive use of tobacco or alcohol, is causative. In some individuals even moderate use of tobacco and alcohol produces, or at least aggravates, pharyngeal inflammations. It is also the result of repeated colds and sore throat.

A relaxed, elongated uvula is a frequent accompaniment of a chronic pharyngitis, and in many cases this seems to be the cause. If touching the base of the tongue it produces either a constant, irritating, useless cough, or else an apparently constant attempt to swallow it, and much resulting hemming and hawking.

Symptoms.—The symptoms are a more or less constant discomfort in the pharynx, hemming, hawking, trying to get up something that will not come. A harsh rasping cough, unaccompanied by secretion, may be present; difficulty and pain in swallowing is not usual though it may occur. Gagging, nausea, vomiting and general irritability of the whole pharynx are common. The examination is frequently difficult and may be impossible on account of the extreme irritability, which is always greater in those who use malt liquors and tobacco to excess. Cocaine is usually necessary for the treatment, and it may be for the examination.

Prognosis.—Its prognosis is in the main good, provided the causes can be remedied. A careful searching after these and an attempt at their removal should be the first object of treatment.

Treatment.—In the early stages, when the general pharyngeal mucous membrane is red, thickened and uncomfortable, and when the individual is constantly trying to get rid of the secretion, I have found nothing so serviceable as the local application with the spray of three per cent. nitrate of silver. Its first effect is to make the throat very uncomfortable, but if it is after a few moments neutralized with an alkaline spray the discomfort soon passes away, and the day following the relief from the treatment is very great. It is repeated at intervals of from two to four days according to the degree of discomfort which the affection produces. Ten per cent. argyrol answers nearly as well and is much less disagreeable when first used. Tannate of glycerine and other astringents can also be used, and lozenges containing guaiac and red gum are serviceable. The gurgling with warm alkaline solution, or the spraying of the throat two or three times a day with something similar forms the home treatment. Constitutional measures are always to be instituted whenever they are indicated. The constant galvanic current, the poles being placed under each angle of the jaw, about ten milliamperes of current for ten minutes, will be found a useful adjunct to the other treatment.

FOLLICULAR PHARYNGITIS.

In the form known as follicular pharyngitis little islands of strawberry-like tissue, varying in size from that of the head of a pin to that of a pea, will be found scattered irregularly over the entire pharyngeal wall. They are frequently especially prominent behind the posterior pillar. These enlarged follicles will have visible bloodvessels running to them, and the whole pharyngeal wall on inspection will have a peculiar mottled appearance, easily recognizable. The follicles are overgrowths of the lymphoid structures.

When they are present there is a constant hemming and hawking in attempting to clear the throat, and it is this condition which is commonly described under the very poor name of clergyman's sore throat, that is to be found in teachers, singers and others who use the voice a great deal, and who in talking have to breathe through the mouth in order to get air sufficiently rapidly.

Treatment.—This consists in the absolute destruction of the enlarged follicles, combined with stimulating applications to the entire pharyngeal wall. If the follicles are very small and are of comparatively recent origin, a number of applications of chromic acid fused on the probe will usually be sufficient. If, however, they are pretty large, standing out sharply elevated above the surrounding mucous membrane, and are very troublesome, nothing is so efficient as the application of the galvano-cautery. The burner used should have a rounded broad end, and should be applied very gently to the surface at a little less than a white heat. The surface must be thoroughly cocainized so as to avoid the possibility of the patient's moving, otherwise there is danger of burning too deeply and having a cicatrix which may be of more discomfort than the original trouble. If the surface is thoroughly cocainized the whole operation can be done without pain, and the individual can be assured that the process will be a painless one. The after sore throat is comparatively slight, unless it has happened that the burn has been too deep and some of the fibres of the posterior muscular wall have been burned. Care must also be taken when touching those follicles which are close to the palato-pharyngeal muscle—the posterior pillar—since any burning of the fibres of this muscle will produce a severe sore throat. In any case there is liable to be some sore throat for a day or two, which, however, quickly passes off.

I would emphasize especially the care with which the galvano-cautery must be used in this operation. Of late years the galvano-cautery from being a much vaunted instrument in rhinology and laryngology has fallen somewhat into disuse. While in no sense a cure-all for all pathological conditions, it is, nevertheless, when properly employed very efficient, and if it is remembered that we are using a powerful agent and it is used with corresponding care, the results ought to be satisfactory, and nowhere more than in this condition. The trouble, however, with the beginner is, that he invariably burns too deeply.

The after-treatment consists of mild applications for a few days, gargles and soothing lozenges. Where a large bloodvessel is seen supplying a follicle the operator should be certain that it is destroyed at the same time as the follicle.

The tonsils, owing to their close relationship to the pharyngeal wall, are frequently simultaneously affected, but they and what is known as the lingual tonsil are considered under a separate heading.

There is a form of chronic pharyngitis characterized by the presence of little whitish-yellow spots scattered here and there over the surface, at times looking like little miliary tubercles, at others showing just the yellowish cast in spots, the whole surface appearing somewhat irregular, which is to me always suggestive of rheumatic or gouty diathesis, and for which constitutional measures are those principally indicated, although local treatment is productive of some relief.

For the constitutional treatment, salol, salicylate of cinchonidia, and the various alkaline preparations, with an abundant drinking of pure water, are indicated.

ELONGATED UVULA.

An elongated uvula often accompanies chronic pharyngitis. If on inspection the uvula appears long and flabby, with its tip in contact with the base of the tongue, especially if this is the case with the tongue well depressed, it is probably acting as an irritant and should be shrunk or a portion of it removed. It may be shrunk considerably by touching the whole surface with chromic acid, previously cocainizing. If this suffices it is all that is necessary; should the shrinking fail to remedy the trouble, amputation of a portion is indicated. This should be done with the scissors or knife, and not with the galvano-cautery.

Cocainize the uvula thoroughly so as to lessen both the pain and the convulsive action of the azygos muscle. Carefully estimate how much it is desired to remove, and remove only, the redundant portion; from one-quarter to three-eighths of an inch should usually be left. In exceptional cases it may be necessary to remove nearly all of it. When possible have the patient hold the tongue depressor. Grasp the tip of the uvula with a long pair of forceps, but without putting the whole uvula on the stretch; with a sharp knife or better with scissors, and preferably serrated-edge scissors, cut on the bias from below upwards, so as to leave the raw edge towards the pharynx. Do not make the cut except when the uvula is at rest and not especially on the stretch, as otherwise there is danger of removing too much. There is no after-treatment required. It is very sore for a few days, and a week will be required for complete healing.

CHRONIC LARYNGITIS.

By this is understood a condition of chronic inflammation of the laryngeal mucous membrane and its adjacent region, the spaces at the sides of the entrance to the larynx and the epiglottis. It may be a sequel to the acute affections, or it may arise independently from much the same causes as those already described under pharyngitis and naso-pharyngitis. In addition to those, any or all of which may be in evidence, excessive and faulty use of the voice is a very prominent factor. This affection is found in those who have to use the voice a great deal, especially if under aggravating atmospheric conditions. Workers in factories where dust is abundant are also especially liable to this trouble.

Symptoms.—The principal complaint is of hoarseness and a feeling of rawness and tickling in the throat and larynx, rarely of pain unless something more serious is the cause. Cough of an irritating, dry character, with scanty secretion, is almost always present. The voice becomes lowered in pitch, and is semetimes hoarse at the beginning of speech, clearing somewhat after longer use; or the reverse may take place, clear at the beginning, hoarse after longer use. The hoarseness of chronic laryngitis is not so complete as is frequently seen in the acute form. Its character is somewhat peculiar, so much so that there is usually but little difficulty in distinguishing at once between the acute and chronic variety.

There may be more or less secretion sticking to the cords themselves or adhering in the space known as the interarytenoid space; and at this point there is likely to be more thickening than anywhere else. The voice will have a harsh, husky, rasping tone, dependent upon how well the vocal cords are approximated. There may later be some erosion and absolute loss of tissue of a portion of the mucous membrane and of the cord itself, producing what is sometimes described as a saw tooth appearance. When this is evident the voice will invariably be very husky, and the production of a clear tone impossible.

Prognosis.—The natural tendency of chronic laryngitis is towards recovery, provided the exciting causes are removed. Recovery, however, is always slow, and if there is a positive loss of tissue in the vocal cords it may be impossible to bring about recovery sufficiently complete to produce a good voice. When the occupation is a predisposing factor, but little that is permanent is possible unless the occupation can be changed for the better. In public speakers, teachers, singers, and the like, this is a very important condition, and its treatment demands the utmost care. The acute affection should, if possible, be prevented from becoming chronic. Anything which interferes with breathing through the nose should be corrected, as all air should reach the larynx properly warmed and moistened, since the breathing in of a dry, irritating, dust-laden air is one of the principal causes of the affection.

Treatment.—First remove the causes as far as possible, and look carefully after the constitutional conditions. For local treatment the larynx should be cleansed with mildly stimulating sprays, and nitrate of silver or the iodine ichthyol compound introduced directly to the larynx on the swab, under the guidance of the laryngeal mirror, in those cases in which the secretion is specially thick and tenacious; when this is not the case, the use of the downward spray under the guidance of the mirror will be found more satisfactory, especially to the patient, than the direct laryngeal application, since a very considerable amount of practice is required in order to make the latter satisfactorily. While its introduction, even after cocainizing, is somewhat disagreeable, I nevertheless find that a spray of three per cent. nitrate of silver is the most efficient treatment in this affection. It astringes and at the same time stimulates, producing a considerable degree of comfort some hours after, and materially influences the progress of the condition towards recovery. After the use of the nitrate of silver I am in the habit of spraying the larynx with a mild alkaline solution, following this with a little stimulating hydrocarbon oil containing camphor, menthol and eucalyptus. Ten per cent. argyrol solution sprayed in the larynx answers in many cases as well as the silver nitrate and requires no preliminary cocainization. In addition to the local medicinal treatment I have found the constant galvanic current to be a most efficient subsidiary measure, the electrodes being placed on each side of the larynx and a current as strong as can be comfortably borne, usually about ten milliamperes, applied for about ten minutes. The skin will be reddened, but there should be no burning. The treatment is repeated every two to four days as circumstances may demand.

The greater the number of attacks there have been, the slower will be the recovery. Persons who are accustomed to recurring attacks of chronic laryngitis every year should be especially careful as to the catching of colds, having damp feet, and the numerous other contributory causes.

Sometimes the false vocal cords are quite as much affected as the true ones; when these are swollen, and meet in the middle line there may be a hoarse tone dependent entirely upon this condition, while the true cords are unaffected.

There is a form of sudden hoarseness in which a person who has previously been talking or reading or singing becomes quickly hoarse on account of an increased secretion in the space between the true and the false cords known as the ventricle of the larynx. This condition is very apt to produce a cough from which there is no relief until some glairy, sago-like secretion is coughed up from the larynx.

Chronic laryngitis is also an accompaniment of all those constitutional affections which may have their seat in the larynx.

CHRONIC NODULAR LARYNGITIS.

There is another form of chronic laryngitis, characterized by the thickening of various portions of the mucous membrane of the cords, principally due to faulty use of the voice.

It is caused by the friction of some portion of the opposing edges of the two vocal cords. As a rule, the part nearest the processus vocalis is affected. The principal symptom is hoarseness. It is comparatively rare.

Its treatment consists in the touching of the enlarged spots with nitrate of silver stick on a properly curved laryngeal applicator. If the voice can be rested for some time the enlarged nodes tend to disappear without treatment.

CHAPTER IX.

ATROPHIC RHINITIS.

The clinical picture of this disease is so striking, on account of the information furnished not only by inspection, but also by the sense of smell, that errors of diagnosis should be very rare. The only disease with which it is likely to be confounded is tertiary syphilis of the nose, and even with this but seldom. Where the disease is at all advanced the odor which comes from it is sufficiently penetrating and characteristic for the physician to have made a provisional diagnosis before he looks into the nose. This will be confirmed by a very cursory examination of the nostrils, when the characteristic secretion will be immediately evident. It is a disease of great discomfort both to its possessor and to all with whom he comes in contact. It is very common, and demands the most careful painstaking treatment.

The term atrophic rhinitis refers to an inflammation of the mucous membrane of the nasal tract accompanied by an atrophy which extends to the underlying structures, and even to the bone itself. The terms dry catarrh, ozena and fetid catarrh, used more or less synonymously for this disease, refer to symptoms rather than to pathology and indicate in a rough way its stages. It is designated as fetid catarrh or ozena when the process is far advanced and the odor very bad.

The disease may be defined as a peculiar, diffuse inflammation of the mucous membrane, characterized by the production of an altered secretion much thicker than normal, quickly drying, forming crusts difficult of removal, and if it has lasted for any length of time, very foul smelling. There is a true atrophy of the mucous membrane, both of the glandular and of the circulatory elements, with atrophy of the underlying structures, fibroid degeneration, and frequently in the inferior turbinate complete destruction of all the erectile tissues. It is met with in all stages, from the beginning where the atrophy is comparatively slight, to that of the most extreme degree, as indicated by the cut from Zarniko. As the patient has usually suffered for some considerable time before seeking relief, the very early stages of the disease are comparatively seldom seen. This may account for the differences of opinion as to its origin.

Symptoms.—The patient complains of choking, dryness, stopping up of the nose, formation of crusts, and of an odor, though of this latter he may or may not be conscious, but may mention it because he has been told that it is disagreeable. The sense of smell is always impaired, and may be completely destroyed. Headache is a frequent accompaniment owing to the reabsorbing of the secretions and the resulting poisoning. Very little change will be noticed externally; possibly the nose may be a little flatter. On examination with the nasal speculum both nares will be found larger than normal, and covered within to a greater or less extent with thick slimy secretion, very sticky and closely adherent to all the structures. The septum throughout its whole extent, the floor of the nose, the full length of the inferior turbinate, the front of the middle turbinate, and the space between the inferior and middle turbinates and the naso-pharynx will be covered. This secretion is of various colors, dependent somewhat upon the atmosphere breathed and the stage of the disease—greenish, yellow, dirty gray or black. The differences in color are due to the environment, and the character of the bacteria. These masses of secretion may be so thick as to practically occlude the nostril, rendering respiration difficult, and the individual may breathe through the mouth even when the nasal passages are very wide. Owing to the increased area of the passages, the expiratory current of air is insufficient to expel the accumulated crusts, which are sticky and tenacious; hence, the patient without artificial aid is only able with the greatest difficulty

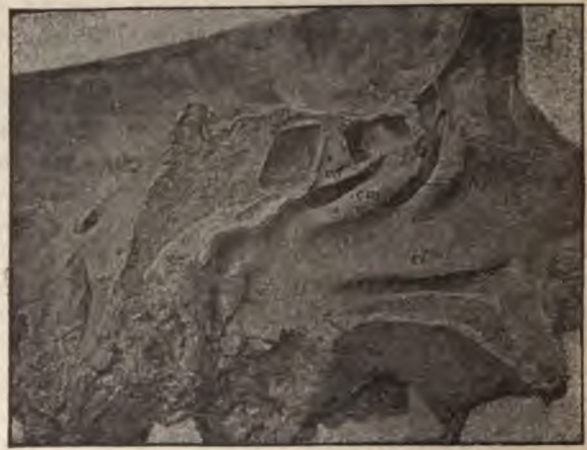

FIG. 31. Left nasal cavity in ozena, *ci*, *cm*, *cs*, lower, middle and upper turbinate; *f*, frontal sinus; *hs*, hiatus semilunaris; *ot*, ost. pharyng. tubæ (Zarniko).

to keep the nose moderately clean. On attempting to remove the crusts they will come away with difficulty, and will be extremely foul in odor. This odor has been variously described by authors, but no description is sufficiently vivid to characterize it; it has only to be smelled to be remembered forever. Zola, in the novel L'Assamoir, has described it in the following language: "She smells in the nose as though she had been sucking her feet." Another author says, "It has a musty graveyard odor;" but it is worse than that.

After the removal of the crusts, the underlying mucous membrane is found to be red, irritated, frequently bleeding, and in very close contact to the bony structures. When not covered with crusts it is much paler in color than normal. On touching with the probe there is very little indentation. The nasopharynx is invariably invaded, and nowhere are the crusts more tenacious, or is the mucous membrane more affected. The crusts are easily discernible on lifting up the soft palate with the palate hook. The pharynx may be also involved, although there will be no such adhesions of crusts owing to their ease of removal, but it will have a dry glazed appearance, and on examination with the probe will be seen to be closely adherent to the vertebræ. The odor usually disappears after thorough removal of the crusts, but returns with every reaccumulation of them.

As a rule, the ears do not seem to be affected, though it occasionally happens that the process has apparently invaded the Eustachian tube, with a resulting otitis media chronica. While the inferior turbinate is invariably atrophied, the anterior end of the middle turbinate may occasionally appear to be enlarged.

Etiology.—While this disease is observed at every age from young childhood, around six or seven years, up to late in life, it probably most often has its time of origin about the age of puberty. Its causation has been the subject of much dispute among rhinologists, and very many theories have been advanced. The one most commonly held has been that this was a later stage of hypertrophic rhinitis, since it sometimes happens that the same nostril shows the presence, in the various parts, of each affection. No definite proof, however, has been advanced in support of this. Bosworth, as a result of his long observation, regards atrophic rhinitis as a development of the purulent rhinitis of children. The secreting surfaces being destroyed, the secretion becomes thicker, easily dries into crusts, and interferes with the respiratory function of the nose. This is followed by atrophy, the odor being due to the dryness and decomposition of the secretions which cannot be removed. Other authors having discovered various bacteria in the secretions have assumed that these were the cause of the disease.

It is found among those who live and work in a very dry atmosphere, and as frequently in those who live in a moist one. While more often evident in those living under adverse hygienic conditions and subject to more or less malnutrition, I have seen the disease just as marked and disagreeable, with the odor as foul, in persons of gentle birth, who have lived under the most perfect hygienic conditions.

Since it has been found to coexist with suppuration of the accessory cavities, especially those of the ethmoid cells and antrum, the theory has been advanced by Grünwald, supported by various observations, that diseases of the accessory sinuses are usually the primary cause. In opposition to this it may be stated that undoubted cases of atrophic rhinitis exist in individuals in whom there is not the slightest suspicion of any trouble with the accessory sinuses. It may be in individual cases the cause, but is in no sense a general one. Again, cases of empyema of the accessory sinuses occur in which there is no trace of atrophic rhinitis, even although the tissues have been for a long time bathed in pus. Bad colds in the head frequently repeated, the exanthemata and other constitutional diseases have been given as causes, and doubtless are at times. Up to the present time no theory seems to really satisfactorily account for the origin of the disease, although all of the causes mentioned are very likely largely influential or, at least, contributory in individual cases.

The odor is a symptom and is no sense the disease. It will occasionally happen that an odor will be evident when there is no objective evidence of the disease. No really satisfactory theory of the origin of the odor has as yet appeared. Whenever there is secretion there will be odor, and in many cases after the most careful cleansing it reappears as soon as the crusts return, long before there can be any chance for a sufficient amount of decomposition to have taken place to allow that theory to be a satisfactory one, although in the main it seems to be the most reasonable explanation.

The only disease with which it is liable to be confounded, especially if it has lasted any length of time, is syphilis, and here the danger is more that a case of syphilis of the nose will be labelled atrophic rhinitis than that the reverse will take place. There is usually but little ulceration, the septum is perforated comparatively seldom, there is no breaking down of bits of bone, nor any falling in or saddle-nose condition of the septum. If ulceration occurs it is due to mechanical irritation rather than to the disease itself. Of course, it is possible that it may coexist with syphilis.

Marked deviation of the septum, whereby one side does all the work and the other is but little used, is perhaps causative; it at least favors very much the onward progress of the disease, and the correction of this condition, so that the amount of air supplied to each side is nearly equal, is sometimes of great value in the treatment. Abnormally wide noses have been regarded as causative on account of the difficulty of properly cleansing them by means of the expiratory air current.

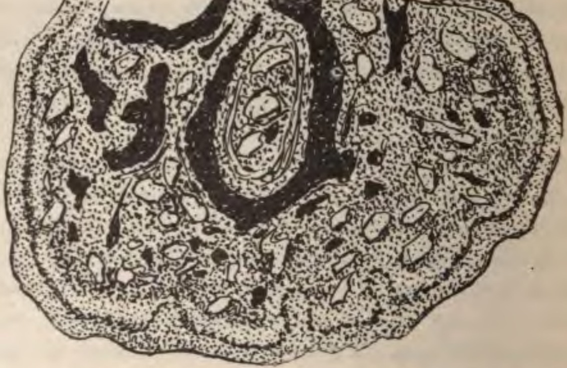

FIG. 32. Atrophy of the middle turbinate; most of the glandular elements destroyed; bloodvessels present (after Zarniko).

Pathology.—Microscopically the secretion is found to contain pus cells, broken down epithelial cells, some fat, and bacteria in great abundance. Sections made from the mucous membrane show diminution in the vascular and glandular elements, with glandular degeneration; a change resulting in the thinning of the epithelial cells covering the membrane, a close attachment of all of the structures to the underlying bone, and a shrinking of this also. The general wasting is accompanied by the conversion of some of the elements into fibrous connective tissue. (See Figs. 32 and 33.)

Prognosis.—Since it is manifestly impossible after the disease is well under way to replace any of the destroyed structures, absolute healing is likewise impossible. If, however, the disease can be seen in its early stage, at the very start of the formation of an altered secretion, and at the very beginning of the odor, or even before, since the odor, as a rule, is a later manifestation, it would seem as though very nearly complete recovery might be obtained. In the later stages, in which are by far the majority of those who apply for treatment, while no absolute cure is possible, much can be done for the comfort of the individual and those with whom he comes in contact. It should be stated at the outset that treatment is long, slow and tedious. I am in the habit of telling

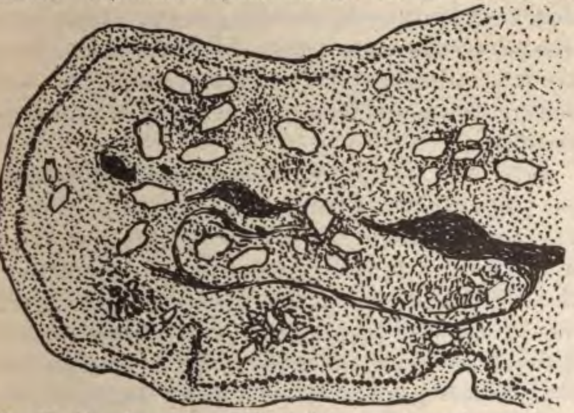

FIG. 33. Atrophy, of the middle turbinate, extreme degree; many bloodvessels destroyed; some of glandular elements still left (after Zarniko).

my own patients that if they are not willing to be under treatment for at least six months, and possibly longer, it is hardly worth while for them to begin at all, since it will take very nearly that length of time to get the mucous membrane in such condition that the individual can satisfactorily care for it himself. The patient is also told that thereafter for the rest of his life he must be careful to keep the nose thoroughly cleansed. If the conditions are accepted, I usually find, that considering the disagreeable nature of the disease, the results of treatment in the relief afforded are very satisfactory. The process can be kept under control, and the individual freed from the disagreeable odor.

Treatment.—This consists of local measures both by the physician and by the patient, and also of constitutional treatment. It may be expressed in the one word cleanliness, and consists in the stimulation of the whole of the nasal and naso-pharyngeal mucous membrane with preparations which favor increased glandular activity, preceded always by the most thorough cleansing, since it is manifestly useless to apply any therapeutic measure to the crusts. As the cleansing is all-important, it may be well to describe it in detail. On examining the patient and finding the nose full of crusts, I am in the habit of syringing both nostrils with large quantities of warm saline solution, and then having the patient blow out as well as he can the accumulated crusts. At the first few sittings this will require considerable time, as the crusts are very tenacious and removed with difficulty. After syringing a few times the nose is examined, and the crusts that remain, being now pretty well softened, are wiped away with wads of cotton on the end of an applicator, care being taken to go over the whole surface clear to the naso-pharynx and the roof of the same. Cleanse the naso-pharynx with applicator and the post-nasal syringe.

When satisfied that all the crusts are removed, and the patient experiencing an extreme sense of relief and cleanliness, we are ready for local applications. These are various, and in the individual case will probably be varied several times as the mucous membrane becomes used after a while to the particular thing employed and it ceases to do as much good. The following will all be servicable rubbed in on the cotton applicator over all the surface that can be reached: Iodo-glycerine with varying strengths of iodine, from 8 to 24 grains to the ounce; the following formula answers very well:

Iodine	gr. xvi
Potass. iodide	gr. v to viii
Glycerine	℥ j

ichthyol-iodine and glycerine; corrosive sublimate 1-10,000 as a solution, or locally 1-1,000; carbolic acid, 1-100; lysol, 1-100; resorcin, 1-100; glycozone full strength; peroxide of hydrogen, full strength; formaldehyde in the water used for syringing, about five drops to eight ounces; the last-mentioned produces considerable smarting, increases the secretion and helps to lessen the odor. Mechanical massage with the cotton alone on the end of the applicator is of use. As the surfaces are apt to be sensitive they had better be sprayed with cocaine after the cleansing and before applying remedies. This has no deleterious effect so far as the secondary congestion is concerned, as mechanical congestion is desired. It is best to begin with some one of the solutions, say the iodide-glycerine, and after a few weeks to change it to something else. For home treatment the patient is given the ordinary alkaline nasal tablet, told to dissolve one in half a tumblerful of water as hot as can be comfortably borne, and with a soft rubber bulb syringe to syringe this quantity into the two nostrils two or three times a day. This prevents the accumulation of hard crusts, and materially assists in the treatment. After the syringing the patient is instructed to atomize both nostrils with a five per cent. solution of argyrol in water. This is stimulant and healing to the mucous membrane and while disagreeable as to its color, has seemed to have more effect in the removal and prevention of the odor and to have a more distinctively curative value than any other remedy. Stronger solutions of argyrol can be used by the physician himself, applied on a cotton swab directly to the atrophic area.

The relief to the patient from treatment is very great, and as a rule the details of home treatment are carried out fairly well. Internally I frequently give from 2 to 5 grains of iodide potassium in some tonic mixture, and such other general constitutional treatment as the needs of the individual case seem to demand. Careful attention should be paid to the general hygiene.

If the case progresses favorably the odor gradually disappears, fewer and fewer crusts form in the nose, until finally there are no more than can be readily removed by the patient himself; the visits to the physician become less frequent, and at last, when there is an entire freedom from crusts, the case is discharged with the strict injunction to continue the daily home cleansing on the lines previously laid down and to return to the physician should there be any evidence of the return of the active process.

The affection in the naso-pharynx and pharynx is simultaneously treated. A dry pharynx is frequently complained of as much as any other symptom, and is less amenable to treatment than the condition in the nose. The same stimulant things are applied, but the prognosis for the patient's comfort is much less good.

Caustic applications are never to be used for local treatment, but only those which are stimulating to the renewed glandular activity. The cotton plug of Gottstein may be referred to, although it does not seem to me to be of special use. It consists in filling the nose with wads of absorbent cotton, for their mechanical effect in provoking secretion and softening the crusts, to be removed after being worn a few hours. As it requires two visits to the physician, one to introduce and another to remove them, its practical value so far as office practice is concerned is not great.

Where there is a deviation of the septum, and the wide open side is filled with crusts, if the septum be operated on and the two nares made as nearly as possible equal in area, there will be an improvement in the atrophic condition, the crusts will be removed more readily, and the whole condition will be improved. On the other hand, I am opposed to removing spurs in cases of atrophic rhinitis, especially if they be on the side affected by the disease, as this only makes the nares wider, whereas it is desirable, as a rule, it have it smaller.

Various medicaments such as iodoform, iodol, aristol, salicylic acid, citric acid, camphor, iodine, tannin, alum, opium, iron, and menthol five grains to the ounce, have been used for the distinct purpose of destroying the odor; these, however, have no special effect in that direction, since the odor usually disappears with the disappearance of the crusts. Oil sprays containing menthol, iodine, camphor and other drugs produce a certain temporary relief, and are used as adjuncts to other treatment by the physician, yet I do not regard them as especially valuable or to be ordered for the home use, since oil is not natural to the mucous membrane of the nose, and as a rule would rather tend to block than open the mouths of mucous glands.

Electrolysis has been advocated, and needles of various metals have been used and good results are reported; it is, however, too time-consuming to be of any great practical value. Some good results have also been reported from the use of antitoxin; but this has not been sufficiently used to admit of its recommendation.

CHAPTER X.

AFFECTIONS OF THE SEPTUM.

General Considerations.—The septum forms the partition wall of the nasal cavities, and is influenced very much in its position and shape by the circumstances attending its development. It is made up of the vomer, the nasal process of the superior maxilla, the quadrilateral cartilage,and the perpendicular plate of the ethmoid. It lies between two very resistant structures—the superior maxilla and that portion of the frontal bone with which the perpendicular plate of the ethmoid is in contact; hence it is easy to see that it is liable to be greatly influenced by the processes of development in structures outside of itself, and also by the development of its own constituent parts. Normally, it should be perfectly straight, perpendicular, and divide the nostrils into two substantially equal parts. Under various influences, such as faulty development and external injuries, or the combination of both, it is liable to bend from one side to the other, and to a certain extent from before backwards, and even in both directions; or there may be outgrowths of bone or cartilage at the points of articulation of its constituent parts; or a combination of both the bendings and outgrowths. These results are commonly expressed as deviations, deformities, spurs, and thickenings of the septum. They are all important, because they limit the free passage of air through the nostrils, making points of contact where there should be none; sometimes absolute adhesions to the turbinates. This causes interference with nasal breathing, and secondarily, pain, headaches, asthma, reflex cough, catarrhal discharge, crust formation, altered tone of voice, and interference with the drainage of the accessory sinuses. Septal deformities are more likely to appear after the second dentition than before.

The obstruction thus produced varies from a very small amount, due to slight deviations from the normal, to almost complete occlusion of both nostrils. The researches of Zuckerkandl and others have shown that in about 75 per cent. of all skulls spurs or deflections are present to some extent. There are no statistics showing the proportion of cases of septal deformity which require operative measures for their relief; the number is large, and deformities of the septum are responsible for a great many of the affections commonly called catarrhal; hence their recognition and treatment is of importance. Beaman Douglas has stated that 11.3 of the nose cases applying for treatment at the Manhattan Eye and Ear Hospital have deflections causing symptoms. Deviations and septal deformities, such as spurs and thickenings, are frequently associated together, but are best considered separately.

SPURS AND THICKENINGS OF THE SEPTUM.

While these are seldom completely obstructive, they are often partially so, and require treatment on account of their interference with the passage of air, and also by reason of their close contact or adhesion to the inferior or the middle turbinate bones. They may be cartilaginous or bony, or both, and are found at the junction of the quadrilateral cartilage with the vomer and the spine of the superior maxilla, and at the junction of the perpendicular plate of the ethmoid and the vomer (Fig. 34). Not infrequently there will be an outgrowth, or spur, beginning at the junction of the quadrilateral cartilage with the vomer and spine of the maxilla, and going backwards, rising higher and higher, as far as two-thirds of the way from before backwards. It is unusual to find either deviation or spur evident on the vomer as seen in the post-nasal space.

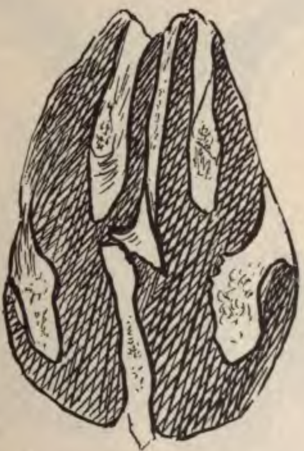

FIG. 34. Spur formed at the junction of the perpendicular plate of the ethmoid with the vomer; due to faulty development. The pressure of the growth of the two bones against each other has thrown them to the right in such a way as to produce a spur on the right side, a small spur on the left side, and a slight deviation.—Author's specimen.

Spurs vary all the way from a pronounced outgrowth lying like a shelf, to a simple thickening of the whole anterior portion of the septum. They may be long or short, and of various shapes, sometimes standing out sharply, at others appearing like ovoid thickenings (Fig. 35). These differences are doubtless due to variations in their origin. As a rule they are the result of external injuries plus faulty development. An injury occurs, either in childhood or later life, which is pernaps not noticed at the time; there is a nose bleed, and the condition is soon forgotten. A callus is thrown out, a thickening forms, a certain amount of absorption takes place later, and finally a decided spur, or at least a thickening, is left at the part of the septum which originally received the injury. Sometimes there will be two distinct outgrowths on the same side of the septum, one lying nearer the front than the other. In the front part of the nose they are usually cartilaginous; in the middle, cartilaginous and bony; and posteriorly, apt to be bony. In its development the septum is made up of two plates, and

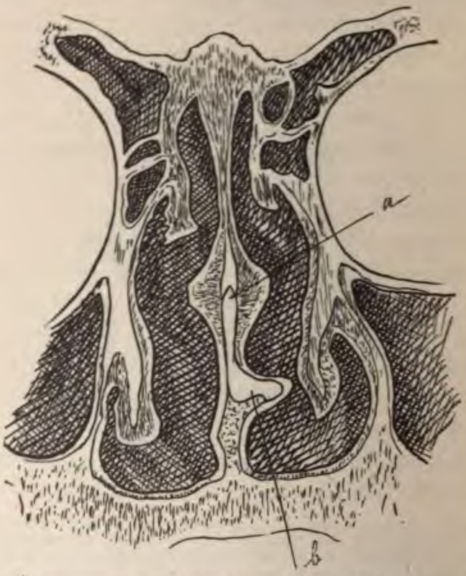

FIG. 35. (*a*) Spur on each side of the septum at the vomer-ethmoid articulation. (*b*) Spur on the left side of the septum at the junction of the septum cartilage and vomer. Somewhat diagramatic; modified from Zuckerkandl.

not infrequently the bony spur is an outgrowth of one plate only, the corresponding plate on the opposite side showing no change; again, both plates are involved. While the spur is usually on one side only, it may happen that there will be one in each nostril, but at different points of location.

Treatment.—This depends entirely upon the degree of obstruction. Not every spur or thickening of the septum demands removal. Removal is demanded only when the obstruction is a positive one, in contact with its opposing turbinate, or nearly so, and a manifest hindrance to the free passage of air through the nose. When there is complaint of frequent interference with breathing on the affected side, and it is clear that there is insufficient room, the condition should be treated; if, however, the nostril is roomy, and the spur or thickening comparatively

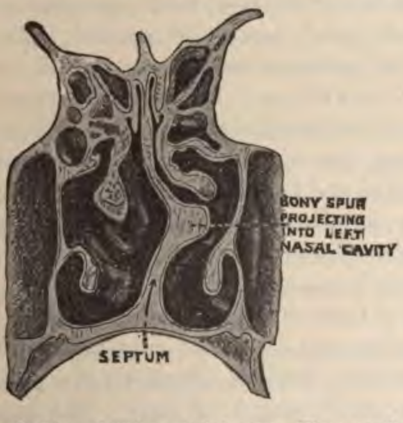

FIG. 36. Section showing septal spur. The opposing turbinate is not so well developed as its fellow of the opposite side, and there is *apparently* sufficient air space. It will be noted that on its upper surface the spur is very close to the middle turbinate. In case of inflammation of this turbinate or of the accessory cavities, it would probably interfere with the drainage, and its removal be demanded for this cause even though there was no manifest interference with the passage of air through the nose.

slight, it may be left alone. Not infrequently the opposing turbinate will be found a little indented, as though adjusting itself to the deformity (Fig. 36). As a rule it is preferable to remove a bony spur from the septum rather than to destroy a portion of the opposing turbinate, which is always to be preserved when possible on account of its physiological functions.

There is only one method of treatment which is of value, and this is the removal of the offending material. While many means of removal, such as electrolysis, the galvano-cautery, caustics, the trephine, the chisel, the knife and the saw, have been advocated, they can all be disregarded except the knife and saw. With a long thin-bladed knife, nasal scissors, nasal forceps, right and left bevelled-edge upper cut saws, and an upper cut saw with the teeth at right angles to the blade, all spurs and thickenings which require removal can be taken care of.

Method of Operating.—With the aid of cocaine and suprarenal capsule, sufficient anesthesia and practically a bloodless field of operation can be obtained for the requisite length of time. The patient can with truth be informed that the amount of pain will be inconsiderable, and that very likely there will be none whatever. For several minutes previous to operating, the cocaine is applied on cotton swabs all over the area to be removed, and thoroughly rubbed in, beginning with four per cent. and ending with twenty per cent. This is followed with the suprarenal in the form of the powder rubbed directly over the surface, or fresh aqueous solution in the proportion of ten grains to the dram and filtered, or of the adrenalin 1 to 10,000 solution with chloretone. The latter is the more convenient form, and can be boiled, if necessary, without losing its hemostatic effect. Eight to ten minutes should be spent in getting complete anesthesia, which is to be tested before using any of the cutting instruments. The surface to be operated upon will appear pale and blanched. The patient's head should be firmly held by an assistant standing behind. The light should be satisfactory, and all the instruments, previously sterilized, close at hand. If the spur is in the anterior portion and cartilaginous, it is as quickly and readily removed with the knife as with the saw; when it is further back, and is presumably cartilaginous and bony, the saw is used.

I usually attempt to strip up and save the mucous membrane from the portion to be removed. This is difficult to do and is frequently unsuccessful, but when it can be done it saves time in the healing, as the raw surface can at once be covered with mucous membrane. If, however, the attempt is a failure, no harm results, since if a smooth surface is left nature soon covers it over with a new mucous membrane, which after a few months seems very much like that surrounding it, although it is probably deficiently supplied with glands; these, however, are not abundant anywhere on the septum.

Before beginning, satisfy yourself that you are dealing with a spur and not a deviation, and that the saw will not penetrate to the opposite side. In the case of a spur the septum will be straight above and below the point to be removed.

The parts being completely anesthetized, the saw is entered from below. If the spur stands out like a shelf, the ordinary nasal saw answers very well. If the point at which it is desired to begin is very slanting, it is best to use the bevelled-edged saw until a path is made, and then finish with the other. Put the force of the stroke according as the teeth of the saw are directed; most saws are made to cut with a forward stroke. Be careful to hold the speculum so that the teeth of the saw will not hit the cartilage of the external nares, and if necessary, wind a little cotton around the forward teeth. Also be careful not to hit the posterior pharyngeal wall, which is not anesthetized, with the tip of the saw. Saw rapidly and steadily, with the saw so directed that the cut will be parallel with the main line of the septum. Continue sawing until the patient begins to complain of pain or until all the bone is sawed through. If much pain is complained of, remove the saw and apply more cocaine. Almost any size of a spur can be removed with the aid of two or three recocainizations; usually none is needed. As soon as the bone is all sawed through, remove the saw, leaving the cut portion in situ. Grasp the bony portion with the forceps and shell out from the overlying mucous membrane if possible. When this cannot be done, it will be necessary to cut the overlying mucous membrane with the scissors. When the spur is far back, it is seldom possible to save the mucous membrane.

If the operation has been satisfactorily done, on the removal of the spur the septal line will appear straight, and air will pass freely through the nostril. Up to this point there has been no bleeding of any account, and if the operation has been skillfully done the opposing turbinate structures have not been injured. Care must always be taken not to hit these latter with the saw, as if they are wounded there is danger of adhesions during the healing process. The cut surface is touched with peroxide of hydrogen on the cotton pledget to favor coagulation, and the patient is kept in the office for about an hour, when if there is no bleeding he may be allowed to go home, if it is not too far distant. Lightly touching the sawed area with strong solution of nitrate of silver or with the salt fused on a probe lessens the liability to hemorrhage and does not delay healing. Put a pledget of cotton in the outer portion of the nostril, and give him instructions to notify you at once if the bleeding becomes anything more than gentle oozing.

After the effect of the cocaine and suprarenal capsule has passed away, there is not infrequently considerable hemorrhage, and if at the end of an hour or sooner this appears, or if the patient lives at some distance from the office of the physician, it is better before allowing him to go to introduce a gauze tampon loosely laid against the point from which the bone has been removed. This is removed from two to four days later, in the manner previously described. In any case the patient is directed to present himself for inspection in two days, at which time the nose will be found completely stopped up from swelling of the various structures, and from the formation of a protective cover, a kind of scab, over the operated part. The nostrils are gently cleansed with warm alkaline solution. The parts are not poked. The after-treatment from this point is slight. The patient reports every other day, the scabbing gradually disappears, the soreness grows less, the swelling goes down, new mucous membrane forms, and in three to five weeks recovery is complete. If everything goes satisfactorily there is interference with the person's occupation for only about two days, and possibly not that. The after discomfort will be very much less if it is not necessary to apply a tampon. Any excess of granulation tissue must be looked after during the healing process, and if there should be any tendency, as is sometimes the case in narrow nostrils, for the opposing turbinate to become adherent to the septum, it must be separated by a thin plate of sheet rubber; this is obtained at any rubber store, is sterilized, cut to the proper shape, introduced between the turbinate and the cut surface, and a string attached so that it will not slip so far back as to be difficult of removal.

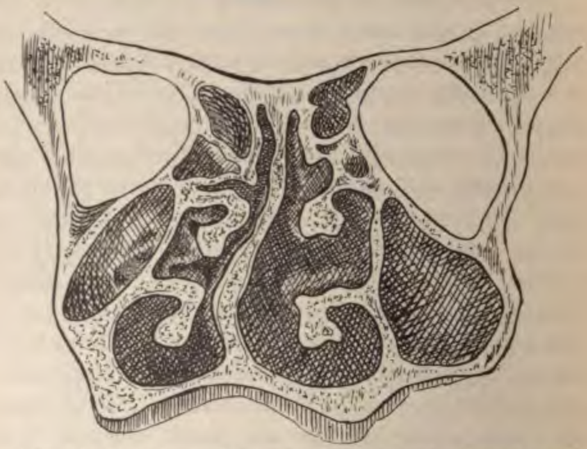

FIG. 37. Deviation of the septum to the right. A good case for either the Gleason or the Asch operation.

DEVIATIONS OF THE SEPTUM.

As stated in the general considerations, the anatomical conformation of the septum is such that it is easily thrown out of its vertical position to one side or the other, with resulting occlusion. Many of the causes operative in the formation of a spur, such as external injuries and defective development, or a combination of both, are also operative in the formation of a deviation. High arched palate such as is common in mouth breathers is probably a frequent cause. Deviations seem to be more common than spurs in children, or at least are more often noted, since the obstruction to breathing is much more complete. They occur in the cartilaginous or cartilaginous and bony part of the septum, very rarely in the bony alone, and most often in the cartilaginous. Roe says that they occur in the osseous portion rarely; in the cartilaginous portion in twenty-five per cent. of cases; and in the osseo-cartilaginous in seventy-five per cent. (Fig. 37.)

The diagnosis is readily made by inspection. On looking into the nostril, one side will be found completely closed, the septum appearing like a red door in close contact with the inferior turbinate when the obstruction is complete, and less evident, but plainly to be seen, when it is of less degree. Unless the deviation is extreme the external nose does not usually show its presence, but may do so. The opposite side will be concave and roomier than normal; the breathing, however, may be very bad on that side, owing to the fact that the anterior end of the cartilage frequently pushes into the front of the anterior naris in such a way as to almost occlude it. The curve of the deviation may be S-shaped from before backwards and U or V-shaped from above downwards, the point of the V or bend of the U being the point of union of the cartilage and the vomer; and both of these forms may be in a measure combined. The deviation is usually to the left. In addition to the deviation there may also be a spur, bony or cartilaginous, at this point, and if one exist, it should be removed under cocaine previous to operating for the deviation (Fig. 38). Care must be taken not to mistake a V-shaped deviation for a spur; the examination of each side will easily determine the true condition. On examining with the finger, it will now and then be found possible, though painful to the patient, to push the septum back into the middle line; but owing to the great elasticity of the septum it immediately goes back to its former position on removal of the pressure, and all attempts to remedy the condition by these means, without destroying the elasticity of the septum, result in failure and are at the same time extremely painful.

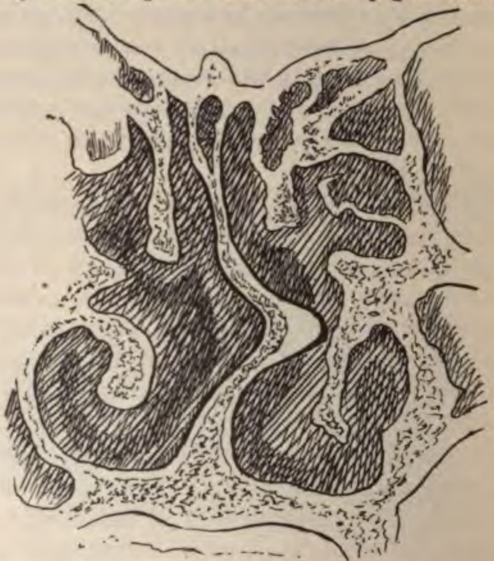

FIG 38 Deviation of the septum to the left, with bony spur at the junction of the vomer and ethmoid. In life the spur was in contact with the opposing turbinate.

Symptoms.—The symptoms are those which result from interference with nasal respiration, and have been sufficiently described in other places. Whenever this condition is present to such a degree as to interfere with respiration it should be corrected.

Prognosis.—The prognosis is good provided the proper operation is selected, and it is done with sufficient thoroughness. It is true, however, that it is almost impossible to make the occluded side as good as the unobstructed one, since after any operation the septum seems to have a tendency in a longer or shorter time to assume to a greater or less degree its old shape.

Treatment.—This consists in a breaking up of the resiliency of the septum, and restoring it as nearly as possible to its perpendicular position, and disposing of the redundancy which it is evident must be present after the bent septum is restored to the vertical position. All operations which are proposed for this condition have that as the desired end. Before doing any operation the operator should be sure that the end will justify the means. Although the deformities are so varied that no one method is applicable to all conditions, the operative procedures may practically be reduced to two or at most three, which will each be described under the heading of the name of its originator. Other operations are described in the books, most of which differ only in some modification of detail from the ones to be spoken of. The inferior turbinate in the free side is sometimes so large as to require reducing by the cautery or knife before any operation is done on the septum.

The Gleason Operation.—This is applicable to those cases of deviation of the cartilaginous or cartilaginous and bony septum which lie pretty well forward, are quite obstructive to one side, and where the other side is very roomy. It is done under cocaine, the surface being prepared as described in the previous section. The saw is introduced at the very bottom, under the deviation, and to quote the originator, "continued in a horizontal direction until the saw has penetrated somewhat deeply into the tissues. The direction of the sawing is then rapidly changed to a nearly vertical direction." The sawing is continued until very nearly the top of the convexity is reached, the saw being kept as nearly in the vertical line as possible, "exactly parallel to the septum, in order that the saw cut shall be *around* and not *through* any part of the deviation." The opposite nostril is of course at once entered, and the middle portion of the blade of the saw lies in this side during the greater part of the operation. The saw is removed as soon as the deviation is cut around, long before there is any danger of cutting the flap off completely, and the incision is prolonged upwards with the knife if necessary. This makes a U-shaped flap. When the sawing is completed, the U-shaped portion of the septum, attached only above, is forcibly pushed through the opening into the opposite side, and its resiliency completely destroyed, so that it hangs only by gravity from above downward, with no tendency to go back to its former position. Any superabundance of tissue which appears in the flap pushed into the previously open side is removed with scissors at the time of operation, or, what is better, left until some future day. A hollow splint, only large enough to hold the flap in place without producing pressure is placed in each nostril to control the bleeding, and the operation is completed. Union of the cut surfaces takes place in a short time. Any thickness or roughness at the place where the parts were pushed through is removed with the knife during the healing process. A very good septum results, the thickenings becoming smoothed down in time.

The splints are worn in the previously occluded side for one or two weeks, being removed daily for cleansing; and in the previously free nostril for one or two days, or until there is no longer any danger of hemorrhage.

This operation can be rapidly done, requires no anesthesia other than cocaine and suprarenal, and its results are fairly satisfactory in properly selected cases. The deviation, however, must be such that a good-sized U-shaped flap can be sawed out without danger to other parts, and the previously occluded side must be roomy enough to take the flap into that side without being occluded by it. In the few times I have performed this operation it has been very satisfactory- I prefer, however, in the main, the one next to be described, known as the Asch.

Asch Operation.—In Dr. Asch's own language this operation is described as follows: "It consists in making a crucial incision through the cartilaginous septum, breaking down by the finger or forceps the bases of the segment thus formed, and the insertion of a hollow splint." He has devised some elaborate instruments, but these are not necessary, since anything in the shape of instruments which satisfies the above description will enable one to perform the operation, which is done under ether: The bleeding is profuse for a few moments, though this can be much lessened by previous preparation of the surfaces with cocaine and suprarenal capsule. This operation is applicable to practically all of the deviations of the cartilaginous and to many of the osseo-cartilaginous septum where the deviation is at all marked, and if properly done the results will be satisfactory. I prefer a very short knife, known as the nasal cartilage knife of Kyle; but any thin-bladed, sufficiently long-handled knife, with all of the blade guarded except the very tip, will answer. One finger is placed in the open nostril, and to lessen the liability of the swallowing of blood, I am in the habit of putting a tampon attached to a string far back in this side. Any adhesions are separated with an elevator. The knife is introduced in the middle of the deviation in the convex side and carried in a slanting direction upwards and downwards from this point, making a cut from one-half to three-quarters of an inch or more in length and to the floor. I make my first cut antero-posteriorly at the angle of deviation, and then another as nearly as possible at right angles to that. This leaves four conical points, fastened at their bases, free in the center; the center should be at the point of the greatest bend. With the finger these are now pushed backwards and forwards until the resiliency of the parts is totally destroyed at their bases. With an Adams or Asch or other compressing forceps, the edges of which are rounded, the parts are now brought into the median line, and it is noticed whether they will stay there or whether they tend to return to their old position; in the latter event the finger is again introduced and the resiliency thoroughly destroyed. The destruction of the resiliency is the essential part of the operation, and if it is not accomplished, the septum tends soon after healing to return to its old position. This is especially true of the segments on the floor of the nose, the base of which is usually bony. Any loose spiculæ of bone are removed. Finally the parts are brought into the middle line with the compressing forceps. A hollow nasal splint is then introduced into each side, the slightly larger one being placed on the previously occluded side.

The patient is put to bed, and ice applied externally. Considerable swelling and some pain are likely to follow for the first forty-eight hours. The splints are then removed and cleansed, and thereafter this is done every day. At the end of a week the splint is removed from the previously open side, and a smaller one placed in the previously occluded side. The splint is worn in the latter for four weeks, being removed and cleansed daily by the patient himself. The principle of this operation consists in the taking care of the excess of tissue which is manifestly present when a curved surface is suddenly made straight by the sliding of the fragments by one another at the points of intersection of the four quandrants; and this is very much favored by slanting incisions.

Dr. John O. Roe has devised another operation for deviated septum which will be briefly referred to. It is done under cocaine anesthesia for the most part, followed by chloroform at the moment when the pain is greatest. His method is adapted to deviations of the cartilaginous and bony portion as well as of the cartilaginous alone, and to quote the author's words, " is based on the principle of a force applied to one side of the septum, indenting it between two opposing points of resistance placed on the opposite sides." He uses a pair of fenestrated forceps, " one blade of which is made in the form of an ovate ring, termed the 'ring, or female blade,' and the other made in the form of a long, narrow, rounded blade, termed the 'single, or male blade.' " The ring blade is introduced on the concave side, the single blade on the occluded side, and pressure is now applied to the curved portion to press it into position. When this is done in the bony portion of the septum, " the redundance is accommodated by the impaction and crowding together of the fragments, if sufficiently comminuted by the forceps." If, however, the bend in the cartilaginous portion is large, it becomes necessary, as in the Asch operation, to provide for the redundancy by incising the cartilage on the slant so as to allow the severed portions to slide past each other. The after-treatment is the same as for the Asch operation. While the author does this under cocaine and chloroform anesthesia, it would seem as though complete anesthesia would be more satisfactory.

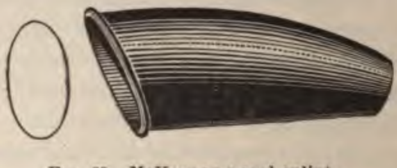

FIG. 39. McKernon nasal splint.

A perforation sometimes results from the operation for deviation, on account of faulty technique or too great pressure of plugs interfering with nutrition. While a perforation is undesirable, no great harm results, and the patient is usually unconscious of its presence.

When there is a projection forward of the tip of the cartilage into the entrance of the nares on the free side, this should be operated on at the same time as the deviation. Incise the skin to the cartilage at the junction of skin and mucous membrane and as far down as the floor of the nose. Shell the skin back, when the cartilage will project. Cut off all that it is necessary to remove, with knife or scissors, and allow the parts to come together. No stitches are needed. The operation will often render much straighter a very much bent nose.

Tubes or Splints.—There are several forms of nasal tubes, both of hard rubber and metal, known under the names of the various originators. The original tubes of Asch and Mayer contain a number of holes to prevent their slipping forward. While the holes accomplish this object, they are more painful to put in and take out, are more difficult to clean, and leave little bleeding points at the spot from which they are removed. I prefer plugs without the holes, and those made of hard rubber to those of metal, since the sharp edge of the metal produces more or less pain and erosion of the outer cartilage in the wing of the nose. I have found the most satisfactory tubes to be those known as McKernon's, which are much straighter than those of Asch or Mayer, and therefore easier to breathe through and to clean. The splint of Douglas is hollowed where it comes in contact with the opposing turbinate. Kyle has originated some tubes made of soft metal which are easily cut or bent to fit any nostril. They are made in various sizes and with and without perforations.

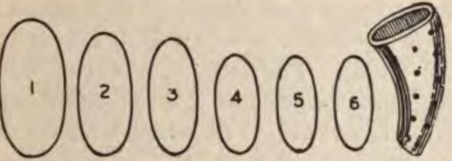

FIG. 40. Mayer nasal splint.

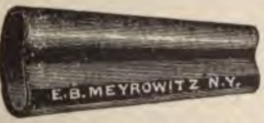
E. B. MEYROWITZ N.Y.

FIG. 41. Douglas septum splint, hollowed on one side where it comes against the opposing turbinate.

The after-treatment of these cases is very important, and any tendency to the formation of redundancies, granulation tissue, or thickenings at any point must be carefully looked after, and these removed with the knife. In spite of all that is done, the operator will probably be surprised six months afterwards to find that an opening in which he readily placed a large-sized Mayer or McKernon tube at the time of operation is so small as hardly to admit the little finger. The patient, however, will rarely complain, since the amount of air is almost invariably sufficient, and the object for which we have done the operation has been attained.

ABSCESS OF THE SEPTUM.

This is an acute circumscribed inflammation of the septum, visible in one or both nostrils, fluctuating under the finger or probe, and is usually traumatic in origin from blows, falls, or foreign bodies. There is first an effusion of blood in the muco-perichondrium; stagnation and degeneration follow, since spontaneous absorption does not seem to be common, and pus results. On account of the thickness of the tissues spontaneous evacuation is delayed some time. The diagnosis presents no difficulties.

Treatment consists in incising and draining at the earliest opportunity, followed by the insertion of a splint or cotton tampon, so as to bring the portions of the septum together again; otherwise permanent thickening results. Make the incision close to the middle line of the septum. If the abscess lasts a sufficient length of time to result in breaking down of the cartilage there may be some sinking in of the front of the nose, with resulting deformity; hence, it is desirable to drain the abscess at the earliest possible moment. Recovery, however, is usually complete and without deformity.

Furuncles at the entrance of the nose frequently cause small abscesses. They start around a hair follicle, and are very tender and painful. Puncture as soon as pus is evident, and pull out all the hairs in the immediate neighborhood.

PERFORATIONS OF THE SEPTUM.

These are comparatively common, and occur in the cartilaginous, osseo-cartilaginous, and osseous portions of the septum. They vary in size from a pinhole to one large enough to pass the finger through. When in the cartilaginous portion they are usually the result of irritation of the septum from crust formation, nose-bleed, or the digging with the nail of the index finger. The vitality of the part becomes lessened, and after a longer or shorter time a hole results. In the cartilaginous portion alone they are very rarely of syphilitic origin; and the presence of a small perforation in the cartilaginous portion should not of necessity suggest syphilis. When the bony portion of the septum is involved or the osseo-cartilaginous portion, and the edges are rough and carious, the perforation is almost invariably of syphilitic origin, and must be treated anti-syphilitically. There is little danger of mistaking the two, since when the bone is affected, it is usually evident to the probe, and spiculæ can often be removed with the forceps.

The treatment in the cartilaginous portion consists simply in keeping the edges clean. If the perforation is very small, and the nasal cavity comparatively narrow, the passage of the current of air may cause a whistle; in this case it is better to make the perforation larger, since larger perforations do not whistle.

Unaccompanied by other troubles a perforation is of very little moment to its owner, and is frequently unknown to him until his attention is called to it by the physician. Perforations may result from the faulty performance of some of the operations for deviation; if, however, they do occur, it is a matter of comparatively little account, since there are no special symptoms attending them, and they are of very little annoyance except that crusts are apt to form on the edges, the nutrition not being sufficiently good to prevent this. They are always found where the finger nail easily reaches.

Workers in phosphorus and other chemicals, the vapors of which attack the bone, may have perforations from this cause alone.

NOSE-BLEED.

While this is a symptom rather than a disease, it is sufficiently common to merit attention by itself. The location of the bleeding point is almost always on the cartilaginous portion of the septum just inside the nostril. The vessels here are of good size, rather insufficiently protected by a very thin mucosa, and the part is one much exposed to irritation; hence the mucous membrane is comparatively easily injured, and has very little tendency to repair itself sufficiently to prevent recurrence. Besides its independent occurrence, nose-bleed is a symptom in typhoid, malaria, pneumonia, and the various congestions; it appears in vicarious menstruation; may be a result of violent exercise; is sometimes caused by traumatism after various nasal operations; is common in people who are known as "bleeders," and occurs in connection with new-growths, as sarcoma, fibromata and telangiectomata.

Its treatment consists of means of stopping the hemorrhage at the immediate time, and in improving the general bodily nutrition. Cleanse the parts and hunt for the source of hemorrhage before making any application. This being ascertained, mechanical pressure in the form of a cotton plug, either dry or soaked in peroxide of hydrogen, is one of the most efficient means of stopping the hemorrhage. The galvano-cautery at a dull red heat, chromic acid, four per cent. solution of antipyrine sprayed in, nitrate of silver, powdered suprarenal, the various antiseptic oils, and the gauze tampon, are all useful at times. When the hemorrhage is excessive it is sometimes difficult to insert the gauze tampon, and various expedients have been devised in its stead. The Bellocq's canula is now an antiquated instrument for this purpose. Except in the case of bleeders, it is almost always sufficient to pack the nostril with gauze strips applied with long nasal forceps carefully laid on layer by layer from the floor of the nose to the top, without packing the post-nasal space. The gauze may be saturated in peroxide of hydrogen or some antiseptic oil; I have often soaked it in a mixture of these, equal parts.

In the rare cases in which this proves inefficient, it is necessary to pack the naso-pharynx with gauze by way of the mouth. A soft rubber catheter can be carried down into the pharynx and a double string attached; a gauze tampon of the desired thickness and length is then attached to the string, and the catheter drawn backwards through the nose. The string should be tied double so that there are two ends left in the nostril and two in the mouth on withdrawal of the catheter. Make traction on the nasal ends until the gauze pledget is firmly placed in the posterior nares. Next pack the anterior nares with gauze; then take a larger piece of gauze, place it in the anterior nares, and over this tie the two pieces of string. This prevents all possibility of losing the tampon in the posterior nares. Now cut the ends in the mouth sufficiently short so that they do not touch the uvula, but are just visible on the pharyngeal wall. This will obviate any danger of producing œdema of the uvula. To remove, cut the string at the anterior nares, remove the anterior plugs, and then the posterior string ends can be easily grasped with the forceps and the posterior tampon removed. This method of tamponing is absolutely certain to control the hemorrhage. It will, however, seldom be necessary, except in bleeders or after nasal operations of exceptional severity, in which the bleeding is not controlled by the usual methods.

There are a number of patients who complain of recurring nose-bleed in whom, on examining the surface of the cartilaginous portion of the septum, there will be found erosion and entire loss of portions of the superficial mucous membrane, and who will give a history of daily or several times daily bleeding, stopping after a little while only to recur on the slightest injury, and sometimes without the parts being touched at all. In these cases all of the various astringents will sometimes be used without avail. I have found such cases very intractable, as it is frequently impossible to get a good mucous membrane to form so as to cover the eroded area. Various astringents, antiseptics and stimulants may be tried in the form of ointments or liquids; sometimes with success and sometimes without. Suprarenal capsule has seemed not only to lessen hemorrhage but also to improve the nutrition of the parts. I usually instruct these patients to carry some absorbent cotton with them and apply a plug of it whenever the bleeding starts.

INJURIES OF THE SEPTUM IN YOUNG CHILDREN.

A large number of the deformities of the septum, such as deviations, spurs and thickenings, have their origin in injuries occurring in young children. These injuries are usually passed by as insignificant by the parents, and are comparatively seldom brought to the attention of the physician. They are of importance; and parents should be instructed to bring them to the attention of the physician.

The child falls, or injures the nose in some way or other in play; it bleeds freely, and the circumstance is soon forgotten. Some weeks, months or years later there will be found an obstruction in one side or the other, due to thickening of the callus resulting from the injury, and forming at some one of the points of anatomical attachment of the various portions of the septum where the original injury was received. If treated at the time they occur, these injuries are easily cared for, and healing is very rapid.

The child should be examined at the time of the accident to see if there is any undue swelling, thickening or deviation of the septum. If there is marked swelling, showing an effusion in the submucous tissue, it should be incised and its contents evacuated. If the septum is deviated simply, or fractured after the manner of a green stick fracture, it should be replaced, and splints applied for a few days to maintain the position. If necessary, an anesthetic should be given, and the idea impressed upon the parents that the matter is of sufficient moment for this to be justifiable. In older children cocaine anesthesia will frequently suffice. Splints of thin, hard rubber or of sheet rubber, to which a string is attached to prevent their passing too far towards the naso-pharynx, thereby rendering their extraction difficult, are passed into the nose to hold the injured parts in proper position. They should be thin and narrow, well lubricated, so as to go in with comparative ease, and not longer than is necessary to reach a little beyond the junction of the vomer with the quadrilateral cartilage. Strips of wood properly shaped will answer very well if made thin enough, as the wood will swell somewhat when in position. These are to be kept in place two or three days. When removed, the condition is usually all right, as there is little tendency for the parts to get out of position.

CHAPTER XI.

NASAL POLYPI.

While the author regards nasal polypi as a secondary rather than as a primary condition, and therefore more properly to be considered in connection with the pathological conditions of which they are the outcome, they are nevertheless so common and so often the one thing for which treatment is demanded, that it seems best to consider them in a section by themselves. The word " polypus " means "many-footed," and is applied to a group of various-sized benign tumors which present themselves in the nose and nasopharynx.

Etiology.—Their point of origin is in the altered mucous membrane anywhere in the upper nasal tract, but for the most part they come from the region of the middle turbinate, hiatus semilunaris, and the mucous membrane of the anterior ethmoidal cells, in which region the mucous membrane is in many places so closely attached to the bone as to partake of the nature of a periosteum as well. They probably grow directly from the bone, as well as from the covering of the bone. They do not arise from the inferior turbinate. Purulent inflammation of the frontal sinus, antrum or ethmoidal cells is one of the principal causes. They also result from simple inflammatory affections of the mucous membrane and bone in this same area, as well as from any cause which interferes with the natural drainage of these parts. The mucous membrane becomes swollen, localized serous effusion takes place in one or more places, and a pendulous mass which later becomes a polyp results.

When once the polypi begin to form, they tend to increase in number and size, coming from many points of origin. See Fig. 42. They are usually present in both nostrils in analogous situations, but this rule is not a constant one. Polypi which present posteriorly are apt to be of a harder and firmer texture than those

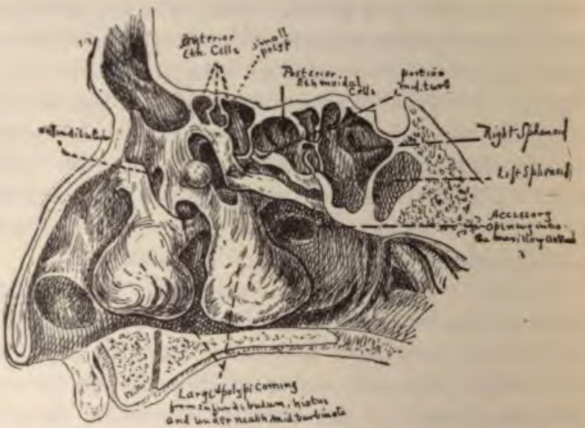
Anterior Eth. Cells
small polyp
Posterior Ethmoidal Cells
portion mid. turb
Infundibulum
Right Sphenoid
Left Sphenoid
Accessory opening into the maxillary antrum
Large polypi coming from infundibulum, hiatus and underneath mid turbinate

FIG. 42. Outer wall of the right nasal cavity showing two large polypi and one small one. Part of the middle turbinate has been removed. Anterior and posterior ethmoidal cells well shown. The obstruction to breathing would probably be complete. (After Zuckerkandl.)

which are found in the anterior portion of the nose. Polypi are most common in adults, occurring rarely in children. There are usually several of them.

Structure.—Polypi are, as a rule, soft, glistening tumors, with epithelium corresponding to that of the surrounding mucous membrane, columnar ciliated in the higher portions of the nasal tract, and non-ciliated and more pavement-celled in the lower. They contain a light stroma, separated by spaces filled with serum. There are many round cells, the number being dependent on the density of the structure. There are but few glands, and these are found near a pedicle. The bloodvessels are scanty, and often appear as minute lines on the surface. The attachment of polypi to the point of origin is usually by means of a pedicle, though they may be sessile. The pedicle, which is made up of the firmer, unseparated stroma of the point of origin, elongates and changes its form somewhat as the polyp grows larger and heavier. Fibrous polypi are occasionally, though rarely, found in the front of the nose.

Symptoms.—These are very various. Frequently polypi are not complained of at all until they have attained such size as to interfere with the passage of air through the nose. They may have existed for years without any special signs. As they grow larger, and project more into the lumen of the nose, they may be complained of for the flapping valve-like action which may be caused by the passage of air through the nose. Aside from their mechanical hindrance to breathing, sneezing, attacks of hay fever, loss of sense of smell, headache and watery discharge from the nose may be complained of. When due to affections of the accessory sinuses, the symptoms will be those of disease in this region, and the accompanying discharge will be purulent instead of serous.

Diagnosis.—This is made by inspection. On looking into the nostril, one or more opaque, glistening bodies is seen, in color somewhat like the pulp of a grape. See Fig. 43. Not infrequently they occupy all of the available space in the front of each nostril; again they occupy only the upper portion of the nasal tract. They are not painful to the touch; and first inspection will seldom determine either their number or size. Examination with the probe should be made to determide the point of origin, which is sometimes difficult to ascertain until one or more have been removed. When present in both nostrils they are usually much more numerous in one side than the other. In my

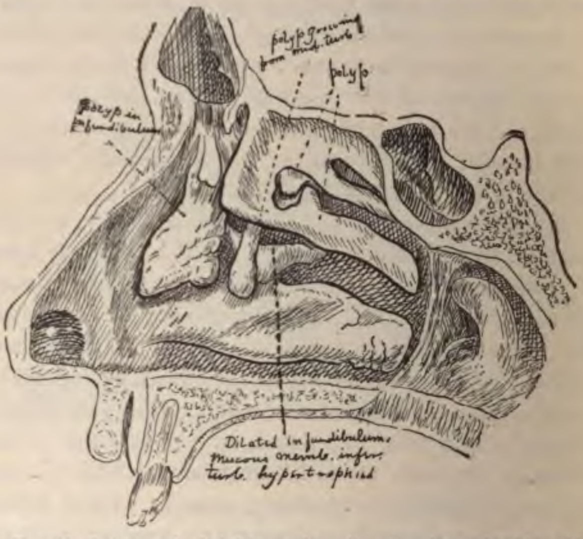
polyp growing from mid. turb.
polyp
Polyp in infundibulum
Dilated infundibulum, mucous membr. infer. turb. hypertrophied

FIG. 43. Outer wall of right nasal cavity, showing polypi in middle and superior meatuses and underneath the middle turbinate. In this case the obstruction to breathing would be but partial. (After Zuckerkandl.)

own experience the left side has been more often affected than the right. They vary in size from small popcorns to marbles or walnuts, and are sometimes found even larger. I have removed a single mucous polyp three and one-half inches long by one and a half broad, which completely filled one nasal cavity. See Fig. 44.

In number they vary from one to fifty or more. I have found more than fifty distinct polypi in the same individual; fifteen to twenty is not uncommon.

Treatment.—The cold wire snare, followed by cutting forceps or curette, is the only form of treatment that is of much use. The area should be cocainized, after which the operation is not extremely painful. This shrinks the polypi to a certain extent, but not a great deal. Arm the snare (the best form of instrument has been previously described) with No. 5 piano wire, making the loop slightly ovoid. Introduce it around the polyp, being sure that it has engaged well. Carry it as near to the apparent pedicle as possible, tighten slightly, pushing the tip of the snare and wire still higher, and when satisfied that it is as near the point of origin as possible, tighten

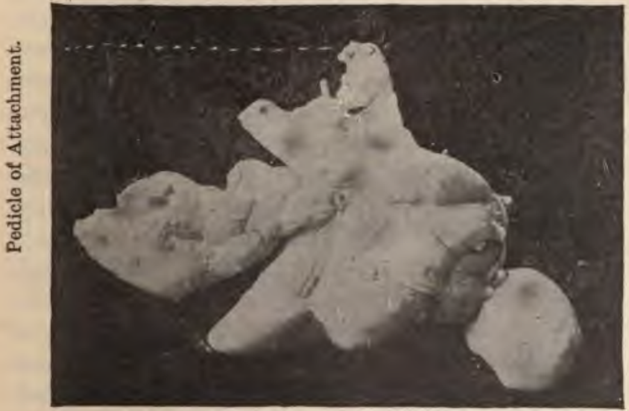

FIG. 44. Enormous mucous polyp, three and one-half inches long, one and one-half broad, which completely filled one nostril. The small piece in the foreground was detached in removal; the remainder was brought away in one piece, after encircling a portion of it with the snare, and employing firm traction. The pedicle is the highest portion of the growth, while the posterior part extended clear to the nasopharynx. Its point of attachment was in the anterior ethmoidal region. (Author's specimen.)

to the utmost limit, when, with gentle traction, the pedicle can, as a rule, be cut through. If not cut through readily, twisting the entire snare will usually twist off the pedicle, and the polyp will come away without hemorrhage. It will sometimes happen that the pedicle is very firm, is attached high up in the nostril, and has several polypi at its terminal end. In such a case, when the pedicle is well engaged, firm traction will sometimes remove quite a mass of polypi, and sever the pedicle from its point of origin. When this happens, the resulting hemorrhage may be considerable for a few moments, but is usually readily controlled by pressure. Large polypi frequently bring away with them small bits of bone, showing their point of origin to have been in the substance of the ethmoidal bone. Under ordinary circumstances the snare is applied repeatedly until all polypi visible are removed, or until the bleeding becomes so troublesome that no more can be seen. Frequently it will be impossible to completely encircle a polyp, which will then have to be removed piece by piece, as much as possible being encircled by the snare at each attempt. At times the tumors are very soft and break easily. Removal should not be attempted after the field of vision has become so bloody that the operator is uncertain as to exactly where the snare is being placed. Lay a pledget of cotton soaked in peroxide of hydrogen against the operated area, with instructions to have it removed in a few hours if there is no bleeding. This is of some importance, as bleeding may start up and be quite troublesome after the patient has gone unless provision has been made for it. Remove the polypi from the other nostril in the same manner, and instruct the patient to report in a week, in the meantime blowing the nose quite vigorously every day. At the second visit careful examination will probably show quite a large number of polypi still presenting, many more than the operator had thought were left behind. This is due to the fact that the polypi were packed high up in the nostril, in the region of the hiatus and infundibulum, and were out of sight; gravity and the action of the air current having brought them into view. Continue in the same manner at intervals of a week until all are removed. Examine then with the probe, and cut away with curette or with nasal cutting forceps any bit of necrosed bone that may be present, so as to leave the nasal mucous membrane as smooth as possible, and without any polypoid secreting surface. In many cases it will be necessary to remove the anterior end of the middle turbinate before a cure will result. The manner of doing this has already been described.

I do not approve of the use of the galvano-cautery for the removal of polypi, much preferring to remove with cutting forceps, curette and snare whatever tissue may be diseased rather than to burn it out, since the latter procedure is more apt to be followed by reaction, especially when used high up in the nose.

Recurrences.—It is generally believed that polypi recur. That a polyp comes again in the same place is doubtful. They recur only when the primary cause is still present, when they have not been entirely removed at the time of operation, or when the diseased mucous membrane or bone from which they spring has not been removed or brought into healthy condition.

In all cases of polypi due to chronic inflammatory conditions, instruct the patient to return at intervals of three or four months, to see if any small polypi remain behind or if any have commenced to grow again. They are then very easily removed if present, and the original condition can easily be prevented from recurring.

In cases due to purulent ethmoiditis or to diseases of the accessory cavities, there is no likelihood of an absolute cure until the conditions which are causative of the trouble have been removed. In non-purulent conditions, I do not think that polypi are liable to recur if once thoroughly removed. Owing to the tortuous nature of the areas whence they arise, complete removal of every bit of polypoid tissue may be impossible. Later on polypi appear, grow large and become visible, and there is an apparent recurrence, whereas they are really polypi which were previously present, but too small to be seen.

Hardly any simple operation gives more relief to the patient than the removal of a mass of mucous polypi, with its consequent restoration of nasal breathing.

Mucous polyps sometimes degenerate into sarcomata, but this very rarely happens.

Fibroma of the Naso-pharynx.—This is a form of hard, fibrous tumor which may come from the posterior ethmoidal cells, the base of the sphenoid or the basilar process, and presents in the naso-pharynx. It has a larger pedicle than the mucous polyp, is much more abundantly supplied with blood, which flows in large venous sinuses, which have slight tendency to retract when divided, grows more slowly, but persistently, and may be so large as to fill the entire naso-pharynx, and even be visible below the soft palate. Fortunately, these tumors are rare. Even when very carefully done, their removal is attended with some hemorrhage.

Removal is most effectually accomplished with a heavy cold wire snare, one having a screw, so that the tightening can be very slowly done, and armed with wire which will cut through without breaking. One of the difficulties is to encircle the growth with the wire. A piece of flexible copper wire, with a shot on one end and a stout thread on the other, is passed through the wider nostril into the naso-pharynx, and then another in the same manner. These are grasped with forceps and removed through the mouth. The two following threads are tied together, and then, with the finger in the naso-pharynx, are thrown around the tumor and carried as high up as possible. A soft rubber catheter will answer just as well for a thread carrier. A piece of piano wire is now tied to one end of one of the threads and traction made on the other, so as to encircle the tumor with the wire. A long canula is next armed with the wire and attached to the snare. The finger should be again placed in the naso-pharynx, in order to bring the wire as near the roof of the naso-pharynx as possible. The snare is tightened a little, and then the tightening process continued by means of the screw. Several hours are sometimes necessary for the removal, without hemorrhage, of a fibroma; and the removal of this form of growth should not be attempted unless everything needed is at hand, and the physician is prepared to tampon the naso-pharynx, should this be necessary. With a curved canula the snare can sometimes be thrown around the growth directly from the mouth more easily than through the nose. Zaufall recommends the preparation of a tampon by means of a string passed through the nose and naso-pharynx and attached to a tampon outside the mouth, so that in case of troublesome hemorrhage the naso-pharynx could be immediately tamponed. The galvano-cautery snare, electrolysis, and various cutting operations have been advocated for the treatment of these fibromata. The cold wire snare is the simplest method of removal and the one attended with the least risk.

Bleeding Polyp of the Septum.—This is rare, and consists of a small angiomatous tumor, varying in size from the head of a pin to the end of the finger, growing from the septum, and bleeding very readily and freely. The galvano-cautery snare, or the cold wire snare with the galvano-cautery tip at red heat at hand, forms the best method of removal. If bleeding follows removal, and it usually will, touch the bleeding spot with the galvano-cautery, and apply a cotton tampon.

CHAPTER XII.

DISEASE OF THE ETHMOID.

The anatomy of the ethmoid bone has already been referred to. To recapitulate briefly: It is a spongy bone, and forms a portion of the center of the framework of the nose; its main divisions on each side of the perpendicular plate are the superior and middle turbinates. External to these are a large number of cells known as the anterior and posterior ethmoidal cells, between which there is usually no communication, and the bulla ethmoidalis, a large single cell. As a rule there are from three to four cells in each division, anterior and posterior, but to this rule there are many exceptions, nor is the relationship between the two constant. The anterior cells open into the middle meatus, that is anteriorly, while the posterior cells open into the superior meatus, and drain posteriorly. The ethmoid region is lined with ciliated mucous membrane which is so closely attached to the bone in many places as to partake both of the nature of periosteum and mucous membrane. See Fig. 45 and Fig. 42.

Acute Ethmoiditis.—The ethmoid is subject to acute inflammations from the various causes which bring about acute colds in the head, of which perhaps the epidemic disease known as grippe, or influenza, produces the most marked symptoms. The acute affections are accompanied by pain, loss of the sense of smell, stuffed feeling, inability to breathe, edematous swelling of the mucous membrane, headache, and secretion, which latter is at first serous, then mucopurulent, and finally purulent. Much the same stages are frequently a part of what is known as a common cold in the head; indeed, acute ethmoiditis is simply a severe head cold.

Treatment consists first, in abortive measures, and later in those which tend to reduce inflammation of the nasal mucous membrane; these have already been considered. As a iocal measure I have found syringing with warm saline solution very helpful.

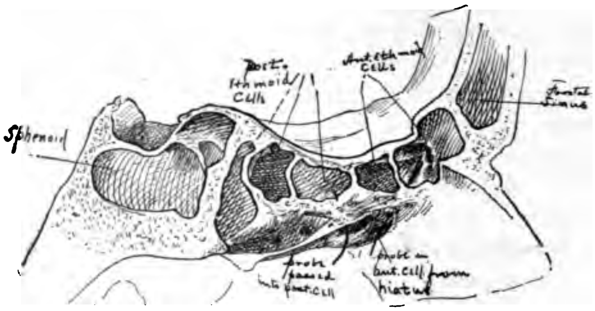

FIG. 45. Preparation showing relation of the anterior and posterior cells to the frontal sinus and sphenoid sinus. The various dividing walls are here relatively thick, but they may be very thin, so that a purulent condition in one cavity can easily extend to others after a longer or shorter time. The close proximity to the floor of the skull is also shown. (After Hajek.)

Under ordinary circumstances the condition goes on rapidly to healing, and in a few days, or at most a week or so, recovery is complete.

Chronic Ethmoiditis.—As a result of repeated colds, or inflammations from any cause, the cells of the ethmoid bone, as well as the mucous membrane covering them, may degenerate, and a mucopurulent or purulent discharge result; or polypi may form as the result of the faulty drainage. Simple edematous polypi, the treatment of which has already been considered, are one of the most common results of both the simple inflammatory and the purulent diseases of the ethmoid. In some cases of long-standing ethmoiditis, the diseased surface secretes pus, and one or more of the various cells becomes filled with it. When the anterior cells are involved the discharge is downwards through the anterior portion of the nose, and on inspection alone the source of the pus may be uncertain, as owing to the swelling of the parts it may appear to come from the frontal sinus or from the antrum of Highmore; and in many cases disease in these parts will have to be excluded before an accurate diagnosis is possible. When the posterior cells are involved the purulent discharge will be into the naso-pharynx, or the posterior part of the nose. These cases are essentially chronic, and frequently last many years. Besides the symptoms referable to the nose this disease tends to produce depression, more or less general malaise, incapacity for work, and possibly a conjunctivitis, owing to the close proximity of some of the anterior ethmoidal cells to the orbit. The orbit itself is sometimes invaded by the disease.

The diagnosis is made by inspection, and by examination with the probe. After wiping away any pus that may be visible, the nose should be re-examined in a short time, and, if possible, the source of the pus ascertained. The whole area should be carefully explored with the long silver probe, every nook and cranny of the nose that is accessible being examined. It will occasionally happen that the swollen nature of the parts and the prominence of the anterior portion of the middle turbinate will prevent a very satisfactory examination, and the diagnosis may be doubtful. A single cell may be filled with pus and yet give no sign of this condition on examination.

When examined microscopically the pus is usually found to contain either the streptococcus or the staphylococcus.

The only treatment that is of any avail, after ascertaining the source of the pus, is to open and, if possible, destroy the individual cells from which it appears to come. This can be done in some instances with the snare, in others with the nasal cutting forceps or with the curette, or perhaps in the same case it may be necessary to use them all. Not infrequently it will be advisable to remove the anterior portion of the middle turbinate as a preliminary step. Owing to the abundant blood supply hemorrhage after this operation may be considerable, and the operator must not be misled by the fact that it does not come on at once, since the cocaine will so shrink the bloodvessels that the hemorrhage may not appear until from half an hour to an hour after the operation, at which time it may be very profuse. This caution is especially needful if suprarenal extract or its alkaloid has also been used. It sometimes happens that the hemorrhage is very profuse at the time of operation. After the cocainization, and before proceeding to use any instrument, the field of operation should be thoroughly inspected, and one's mind made up as to exactly what is desired to be done, and then the operation rapidly performed; since it is a region in which it is not safe to do much operating after the field is obscured with blood. The gauze tampon soaked in peroxide of hydrogen should in all cases be placed as firmly as possible against the operated area, and removed the next day or the day following. In connection with, and both before and after all operative procedures, and where for any reason no operation seems advisable, I have found douching and syringing the diseased area with hot saline solution of the greatest value. When I can do it myself I prefer the syringe, while the patient is allowed a douche cup, and some very intelligent patients are allowed the syringe, for home use.

Ethmoiditis is usually so closely connected with the formation of polypi that the treatment of the two is frequently carried on together. The ethmoid may also be secondarily infected in connection with antrum and frontal sinus disease; and it may be one of the causes of these diseases, owing to interference with drainage from these cavities. It is also probable that many of the obscure catarrhal diseases of the nose, in which the symptoms complained of do not at first sight seem to be warranted by the findings, are due to ethmoid disease. Thorough examination with the probe should never be omitted when exploring this region, and in all operations the position of the lamina cribrosa and the relation of the cells to the cranial cavity must not be forgotten; for, while accidents are rare, the cranial cavity has been opened by both probe and curette. Cutting and curetting is to be done with the instrument directed outwardly and not too high up. All operations in this area are difficult, and should not be attempted except after some experience in performing the less difficult intra-nasal procedures.

The prognosis will depend entirely on how thoroughly the diseased area can be eradicated or brought back to a normal condition. Chronic ethmoiditis is much easier to improve and relieve than to absolutely cure. After apparent healing, cleansing treatment will have to be continued for a long time, and an absolute cure may be impossible.

(NOTE.) It should be stated with reference to the illustrations of the affections now being considered, and of those of the antrum and frontal sinus which follow, that they are used solely as a help in imagining the anatomical conditions present. In the particular instance it is usually impossible to make out all the structures with absolute accuracy, although this should always be attempted, as above stated, with the aid of the probe.

CHAPTER XIII.

DISEASES OF THE ANTRUM.

The antrum is a large cavity situated in the upper jaw and opening into the nose. On the nasal side it is covered over with portions of the ethmoid bone and the inferior turbinate, with a natural opening into the middle meatus of the nose about its middle third. Beside this and posterior to the natural outlet there are frequently one or more accessory openings into the hiatus semilunaris. Its average size is one and one-quarter inches in its antero-posterior diameter, and one and one-quarter inches vertically. It is subject, however, to extreme variations in size,

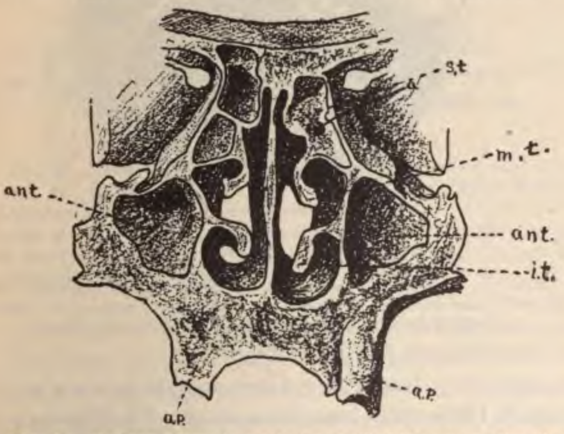

FIG. 46. Section through posterior half of the nose. Small antrum cavities with thick walls; s.t., superior turbinate; m.t., middle turbinate; ant., antrum; i. t., inferior turbinate; a. p., alveolar process; a, bristle passed through one of the posterior ethmoid cells (Hajek).

and is frequently very different in formation on the two sides of the face. With a high arched palate the antrum is long and narrow; with a sinking in of the canine fossa it becomes much shallower. (See Figs. 46, 47.) On its outer wall it is thin, while on the outer portion of its floor the roots of the first and second molars and the first and second bicuspids are not far away; in fact, very frequently there are projections of the roots of these teeth into the antrum. The distance between the roots of the teeth and the floor of the antrum is a determining factor as to the likelihood of cases of empyema being of dental origin. (See Figs. 48, 49, 50.) The first molar and second bicuspid are in closest relation with the deepest part of the antrum. In thickness its floor corresponds to that of the hard palate and alveolar process, while its outer wall is thinnest at the point known as the canine fossa. There is sometimes a partition wall, usually only partial,

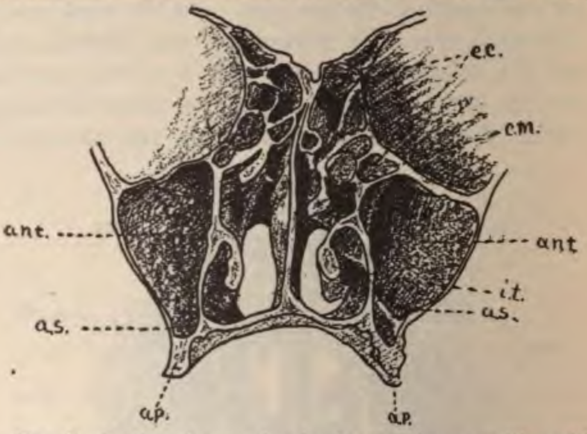

FIG. 47. Section of nose showing large antrum cavities with thin walls and an alveolar sinus: e.c., ethmoidal cells; c.m., middle turbinate; ant, antrum of Highmore; i.t., inferior turbinate; a.s., alveolar sinus; a.p., alveolar process (Hajek).

though it has been found to be complete and to divide the antrum into two cavities. (See Fig. 50.) It is lined with mucous membrane continuous with that of the nose. It is subject to inflammations, the symptoms and diagnosis of which may for a long time be obscure, owing to the fact that its natural outlet into the nose prevents very much tension from the accumulation of the products of inflammation. The inflammations are of two kinds, acute and chronic, which will be separately considered.

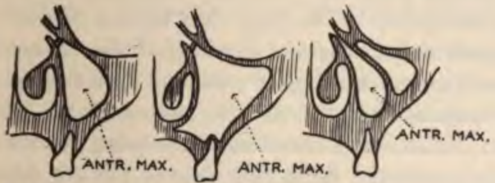

FIG. 48. Normal antrum of Highmore.

FIG. 49. Large antrum cavity with thin walls. Root of tooth has pushed floor of antrum up somewhat.

FIG. 50. Showing bony septum completely dividing the antrum; only the inner half has communication with the nose through the natural opening (Zarniko).

ACUTE INFLAMMATIONS OF THE ANTRUM.

The acute type is a simple serous inflammation coexisting with, or the result of, some general inflammatory condition in the turbinates or ethmoid, whereby the natural openings are closed and the outward drainage for a time interfered with. Influenza, the acute exanthemata, operative procedures in the nose requiring the tamponing of the nasal cavity, head colds intensified by deflected septa, spurs, enlarged middle turbinate, polypi, or any other local pathological condition interfering with drainage, are the principal causes of acute inflammation. In spite of the fact that the natural drainage point of the antrum is higher than its floor, the acute inflammations commonly tend towards recovery, as, owing to the shifting position of the body, especially in sleep, plus the aid of capillarity, drainage is brought about.

Symptoms.—Pain in the affected side; headache; tenderness on pressure in canine fossa; a swollen nasal passage; discharge, serous or sero-purulent, are the principal symptoms. The discharge is one-sided, as a rule, though it is not impossible for an acute empyema to affect both sides. This, however, must be regarded as unusual. One such case has come under my observation. The pain may be that of dull pressure, referred to various portions of the affected side of the face and head. In cases of dental origin the pain may be referred to the region of the affected tooth. Neither the location of the pain nor its character of necessity definitely locates the trouble. In some cases the pain is very severe and is relieved only by the discharge of serum or sero-pus.

Acute inflammations tend to recovery in a short time, and only occasionally become chronic. When they do become chronic it is doubtless due to some interference with the natural drainage.

Treatment.—General measures directed to the cause; measures to relieve the pain; douching and syringing with warm salines, to favor the discharge; careful examination of the nose, and whenever possible the correction of any interference with natural drainage; and the hunting for the natural and accessory openings, are the procedures indicated. The local tension can be relieved by cocaine and suprarenal capsule solution, separately or combined, four per cent. cocaine with 1-10,000 adrenal chloride. Internally, atropia and morphia in the form of one of the many combinations known as coryza tablets, will give some relief. Further therapeutic measures will depend on the apparent cause and the symptoms complained of.

The washing out of the antrum, after exploratory puncture in the manner to be described under chronic inflammation, is sometimes indicated, and will help to shorten the attack.

If the pain disappears, while the discharge continues for weeks and is purulent in character, the condition becomes one of chronic empyema.

CHRONIC INFLAMMATION OF THE ANTRUM.

This is usually purulent, of considerable standing, and arises from two main causes: namely, disease of the teeth; or as a primary purulent inflammation of the antrum, due to obstruction of the natural outlet, to injuries, to the entrance of micro-organisms, or to infection from the ethmoid or frontal sinus. It is probable that these two main causes are about equal in the number of cases which they produce, although some writers lay more to one cause and some to the other. In my own experience the cases have been about equally divided between those that were due to disease of the teeth and those in which the teeth seemed to have no causative influence.

Cases due to Diseased Teeth.—These arise as a result of diseased root processes, especially when the distance between the roots of the teeth and the floor of the antrum is very short. Here a purulent periostitis may go on for a long time before producing any symptoms suggestive of trouble. Not infrequently no complaint will be made of the teeth, or it will be reported that they have been filled, or have given trouble a long time ago, or they may even be apparently sound. Modern dentistry, in its endeavor to save teeth by capping and various methods, not infrequently allows teeth that were better removed to remain in the alveolar process. I have had cases of dental origin that seemed to me to have their cause in capped teeth, and others in which no complaint whatever was made of the teeth. In one instance an obstinate empyema of the antrum was treated for a long time with daily washings through a tube passed underneath the inferior turbinate. Improvement would take place, but as soon as the washings were discontinued the discharge of pus again became foul. No complaint was made of the teeth, but finally the first bicuspid was extracted, when it was discovered that the alveolar process immediately around the deeper portion of the root was carious. A curette was easily passed into the antrum, all the diseased bone removed, and recovery promptly followed. The explanation of the lack of symptoms is to be found in the fact that so long as nature has an outlet she seldom sets up much pain; this is true in those cases of nasal as well as in those of dental origin. The patient will not usually complain of pain but of a unilateral foul discharge.

Cases of Nasal Origin.—These are usually secondary to some obstruction in the natural outlet from enlarged turbinates, deviated septum, spur or other anatomical malformation, to injury, or to disease of the ethmoidal, sphenoidal, or frontal regions. Influenza, syphilis, the exanthemata, and new-growths may be directly or remotely causative.

Symptoms.—Patients with empyema of the antrum complain of a one-sided foul discharge, constant catarrh, or of the polypi that the presence of the foul pus flowing out of the natural opening may have caused. Pain will be complained of but rarely, and never unless there is some stenosis or some interference with the outflow. Obstruction to breathing may be present, with hypertrophy of the mucous membrane of the middle meatus and of the inferior turbinate immediately underneath. One-sided eczema of the anterior nares is a frequent symptom. Disturbance of the sense of smell is frequent, a peculiar odor sense taking its place. This is due to swelling and partial closure of the olfactory fissure.

Diagnosis.—Inasmuch as pus appearing in the middle meatus may come from several sources, the question of diagnosis may present some difficulty. On examining the nose with a speculum, white creamy-looking pus will probably be seen in the front of the nose and around the lower border of the middle turbinate. This should be wiped away, and notice taken as to whether it quickly reforms. After it is cleansed thoroughly lay the head over toward the opposite side, and after a few moments examine again. If pus is still present, and it is underneath the middle portion of the middle turbinate, it is probably of antral origin, as pus from the frontal sinus or ethmoidal cells will be higher up and further forward, nearer the infundibulum and rather in front of the middle turbinate. The pus tends to come forward when the individual is in the upright position, while at night it flows into the naso-pharynx and in the morning is found more or less dried on the naso-pharyngeal wall.

This diagnosis, however, is only presumptive and not absolute. Several examinations may be necessary, as pus may not appear in the nose at the time of first examination. An absolute diagnosis can be made only by puncture either through the floor of the nose or through the canine fossa, or by the extraction of a tooth. The history of the case will help somewhat in determining whether it is of dental or nasal origin. By lifting the cheek with a retractor or with the finger, and thoroughly cocainizing the mucous membrane of the canine fossa directly over the second bicuspid or first molar, a good-sized canula can be easily driven with a light blow directly into the antrum cavity, or the ordinary dental drill will quickly make an opening. Warm sterile water is then syringed through the cavity, when, if pus appears at the nasal outlet, the diagnosis is positive. A positive diagnosis can also be made by puncturing the nasal wall. A half-curved or straight needle pointed or trocar fitted canula is easily introduced underneath the anterior third of the inferior turbinate, carrying it as far up underneath the turbinate as possible, since the nasal wall is much thinner at this point than at the floor of the nose. A slight tap with the hammer is sufficient to carry the canula into the antrum cavity, when water can be syringed through as before. This is usually not especially painful, provided the area is well cocainized.

Transillumination, while a help to the diagnosis, is not of sufficient accuracy to be depended upon, since the individual antra vary very much in thickness. It may be done with a small diagnostic lamp attached to a storage battery, or the street current, provided the voltage is sufficiently reduced. The patient must be in a dark room with every bit of light shut out. The lamp is placed in the mouth and the lips closed. In normal antra the shadows visible should be alike on each side, and the light should appear more or less diffused over both cheeks. In case one antrum is occluded the shadow on this side will be very much darker, and may even be absent altogether. The area of this dark shadow will correspond to the region from about the roots of the teeth to the ball of the eye, while the opposite side will at the same time appear illuminated.

The diagnosis of pus being determined, it then becomes necessary to find out whether or not the case is of dental or nasal origin. Here, the condition of the teeth, the history of the case, and the presence or absence of apparent nasal causes, in the way of an obstructed natural outlet, must all have their due consideration. While it is stated that it is possible to syringe the antrum through the natural opening, it is very rarely the case that it can be done, and in my experience, which embraces many cases of antrum disease, I have never been able to utilize the natural outlet, either for probing or for the passing of canulæ, or for the introduction of fluids into the antrum.

Prognosis.—This will depend on the cause, the length of time the disease has lasted, the presence or absence of granulation tissue, and the possibility of obtaining sufficient drainage.

Treatment.—In a cavity like the antrum, it is necessary for rapid and complete recovery to have good drainage. It has been recommended to make an opening underneath the anterior third of the inferior turbinate, to introduce a canula, and wash out this cavity daily through the nose. In my earlier cases I used this method, and occasionally produced a cure, and it cannot be denied that even cases of long duration have been cured in this way. The method, however, is tedious and disagreeable, is more or less painful, and the canulæ are uncomfortable to wear in the nose, blocking it up, and continually slipping out of position, while irrigation through them is inefficient. Antiseptic fluids of all kinds have usually failed to produce a cure, until at the present time this method is used only when the case seems to have lasted but a short time, and when the permission to do a more thorough operation is not obtainable, or for a temporary measure to see if more radical operation is needed. It is practicable as a permanent measure only when all obstacles to easy outflow through the natural opening are done away with, and there are no difficulties in the way of making a good-sized opening and maintaining it a sufficient length of time.

In using this method, whether for diagnosis or for treatment, some details are to be borne in mind. The point of puncture should be just behind the anterior portion of the middle third of the inferior turbinate. Cocainize thoroughly with 20 per cent. cocaine and adrenalin solution, carry the point of the trocar to the proper place, and as high up as possible underneath the turbinate, and not on the floor of the nose, where the antral wall is much thicker. Either a straight or a curved canula with trocar or a sharp beveled edge canula, straight or curved, without trocar, can be used. After finding the point for puncture, carry the canula against the outer edge of the septum, so as to pierce the antral wall at as nearly right angles as possible. Hold it firmly with the fingers of the left hand, and tap lightly on its end with the mallet. After one or two light taps with the mallet it will be felt to enter the antrum, the giving way of the sense of resistance being evident to both fingers and mallet. Move it about a little to be sure that it is in a free cavity. In some narrow antra, if puncture is made too far forward, the canula can be carried through into the cheek. This is more likely to occur where the canine fossa is very much depressed. I have had this happen once, and blew some air into the cheek. The experience, while devoid of danger, was an unpleasant one. In this instance puncture was made too far forward, as a subsequent puncture, the canula being inserted a little further back, discovered the presence of pus. An absolutely sterile trocar and canula is to be

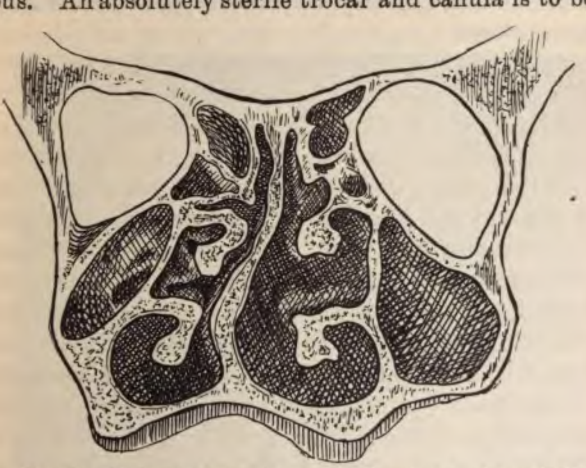

FIG. 51. Right antrum very small. Puncture underneath the anterior end of inferior turbinate, unless made as high as possible and well back, would very likely have entered the tissues of the cheek instead of the antrum.

used, and if no pus is present no harm will be done. If a canula without trocar is used, be sure that it is permeable before introduction. As soon as the canula is in position, sterile water is syringed through it, when pus if present appears in the middle meatus. If none is found, the canula is withdrawn and no after-treatment is necessary and no reaction should follow. If pus is found, and it is an acute case, a few washings through the canula may effect a cure; hence it is desirable to leave the canula in situ, or what I regard as better, to enlarge the opening with drill or curette so that a curved canula can be easily introduced for a short time at least. The ordinary silver or hard rubber Eustachian catheter answers very well as a canula for daily introduction. This enlargement of the opening is usually not difficult to make, provided the area has been thoroughly anesthetized

In all cases in which the pus has lasted for any length of time, and is foul, any obstruction to drainage in the interior of the nose should first be removed. The patient is then etherized. If there is any suspicion of the case being dental in origin, the suspected tooth is removed and a good-sized curette passed up into the antrum cavity, through the alveolar process, the instrument being directed backward rather than absolutely vertically. The ordinary dental drill is not usually long enough or large enough. This was formerly the only method of treatment, but has many disadvantages, owing to the constant tendency of the alveolar process to close, and the impossibility of maintaining an opening for a sufficient length of time to be sure that the drainage has been sufficiently complete and continued long enough to bring about a cure in the antrum, although this sometimes occurs, as in the case referred to. After the removal of the tooth a horizontal incision, one inch long, is made where the mucous membrane folds on to the cheek and at the point between the second bicuspid and first molar. The periosteum is laid bare above and below, and the edges of the wound held back with elevators; a small opening is made with the chisel, and this enlarged with chisel or cutting forceps so as to give an opening sufficiently large to put the finger into, and allow room for thorough inspection. The bleeding will be profuse at first, but is easily stopped by pressure. The mucous membrane is then inspected, and the treatment carried on according to its condition. If simply purulent it is thoroughly cleansed, curetted a little if need be, but not entirely removed, and packed with iodoform gauze. In case there is granulation and extensive disease, the whole area is thoroughly curetted, the

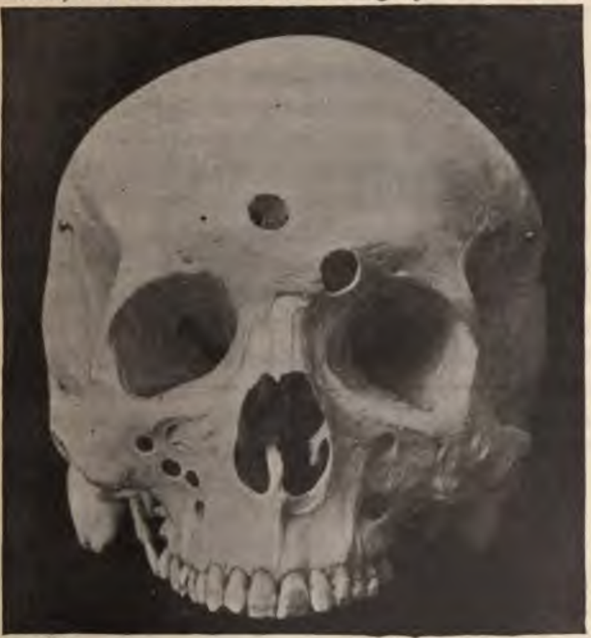

FIG. 52. Skull prepared so as to show sites of operation for empyema of the antrum and frontal sinus. On the left side is shown opening through the canine fossa for empyema of the antrum, while on the right side the small openings indicate boundaries of the antrum with reference to the cheek. Above on the left side is indicated the best place for opening into the frontal sinus from without —the operation beneath the supraorbital ridge; while on the right side is shown the site for operation above the supraorbital ridge, preferred by some operators. (Author's specimen.)

natural opening into the nose either enlarged or else a new one made underneath the middle turbinate sufficiently large so that it will never completely close, the cavity packed with iodoform gauze, and the flaps allowed to come together into place. No suturing is necessary, as long before the cavity is completely healed the mucous membrane will have united, and nature will have formed what is practically new bone on the periosteum. (See Fig. 52.)

The after-treatment consists in daily washing with dilute antiseptic solutions, as hot boric acid solution, corrosive sublimate 1-10,000, protargol one per cent., H_2O_2, silver solutions, and others. The gauze is kept in until suppuration seems to have ceased and healthy mucous membrane has begun to form. The opening must be maintained some time after apparent cure, as otherwise the condition may recur. The difficulty in operations of this class is not that the opening remains open but that it closes too soon. In all of my cases the bony opening even when made very large has rapidly closed. In one instance after a large opening into the alveolar process and a much larger one through the canine fossa, I was obliged to have a tube made and put through the alveolar process in order to maintain drainage a sufficient length of time, the opening into the canine fossa having entirely closed. No deformity or falling in of the cheek follows this operation.

Hajek, of Vienna, has recently devised a new method of operating for antral disease. Incision is made as just described, the entire bony wall in front of the antrum is removed, the mucous membrane curetted, and all diseased portions removed, and then an opening made into the nose with cutting forceps, first above and then below the anterior third of the inferior turbinate, after which the entire anterior third of the inferior turbinate is cut away. The cavity is next filled with gauze, the end being left in the nose, and the soft parts over the canine fossa sutured. All further treatment is carried on through the nose, the gauze being left in situ several days and then replaced at intervals during the healing process. The advantage of this is that it obviates the disagreeable after treatment, and the taste of the iodoform gauze in the mouth; it, however, requires some skill in its performance, and is not so readily applicable as the operation through the canine fossa that I have just described, which is devoid of risk and can be done by anyone of ordinary skill. The after-treatment consists in irrigation and packing the cavity with iodoform gauze. The irrigation is the main thing, and the amount of gauze placed in the cavity should be steadily lessened, nor should it be necessary to pack in huge quantities for an indefinite time. Powders and various antiseptics are of comparatively little use provided the drainage is good enough; the one thing essential is gravity drainage; and one should be sure that the bony opening in the anterior wall extends to the floor of the antrum.

Will this produce a cure? Usually it will; though an author of as great experience as Grünwald has stated that with any method one may achieve failure; so that we are not to be discouraged if a case seems to drag on for a long time. Grünwald gives the time required for cure as from eight days to nine months. The author has seen cases of the foulest antrum disease of probably dental origin heal with entire cessation of discharge in from three to four weeks, after opening into the canine fossa and through the alveolar process.

A complete operation with good drainage, while it may appear more formidable and radical at the time it is done, is nevertheless much more satisfactory both to operator and patient, since the time of healing is shorter and the disagreeableness of the after-treatment much less.

Recurrence rarely takes place. In cases complicated with frontal sinus disease it will occasionally, though rarely happen, that an opening may have to be kept through the canine fossa for some time. I have had one case in which a small opening was maintained for nearly two years, healing of the empyemata of both cavities finally taking place. It will not infrequently happen in cases of supposedly dental origin that it will be possible to determine the diagnosis by the extraction of a tooth, and even to institute measures of treatment through the alveolar process. Even in these cases, if the disease has lasted some time, an average dental drill makes such a small opening that treatment is apt to be unsatisfactory. When this is the case, it is better to do the canine fossa operation, at the same time opening the alveolar process freely into the antrum.

CHAPTER XIV.

AFFECTIONS OF THE FRONTAL SINUS.

The most dependent portion of each sinus opens downward into the nose through a duct called the fronto nasal opening. This duct varies in diameter from one-eighth to three-sixteenths of an inch, and in length from one-half to three-fourths of an inch. Its outlet is in the infundibulum, a term applied to the upper and anterior portion of the hiatus semilunaris, where it is bounded in front by the uncinate process of the ethmoid, and internally and above by the anterior third of the middle turbinate bone. This outlet is in intimate relationship with the anterior ethmoidal cells. The anterior wall of the frontal sinus is relatively thick, its posterior wall less so, but yet quite thick, while its thinnest wall is over the orbit, a portion of the roof of which it forms, and at which point the wall may be very thin. It is lined with mucous membrane continuous with that of the nose. See Fig. 53.

ACUTE INFLAMMATIONS OF THE FRONTAL SINUS.

These occur in connection with the ordinary acute inflammations of the nasal membrane, such as acute colds in the head, grippe, and the exanthemata. They are due to the extension of the inflammation along the mucous membrane, or to obstruction of the natural outlet.

The *symptoms* are headache, a sense of constriction in the forehead, pain over the sinuses and at the inner angle of the eye, accompanied by secretion. The secretion consists of mucus, or muco-pus, or it may be purulent, although acute purulent inflammation of the frontal sinus is comparatively rare. The sinus may also be acutely inflamed as a result of disease processes in the neighborhood of the middle turbinate and ethmoidal cells, which processes interfere with the natural drainage from the sinus.

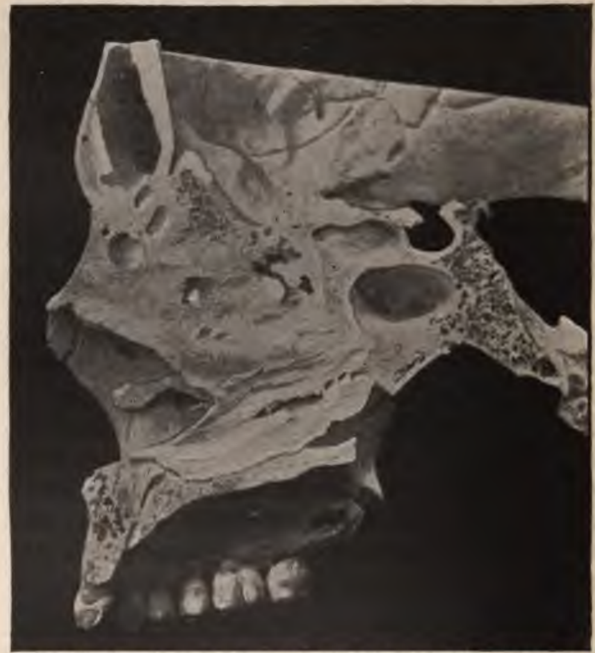

FIG. 53. Specimen with roomy frontal sinus and comparatively thick anterior wall. Operation at the inner angle underneath the supra-orbital ridge would have given free access to all parts of the cavity. (Author's collection.)

Diagnosis.—This is made from the symptoms in case there is no discharge of any amount other than mucus or muco-pus. If pus itself is present, it may be seen on looking into the nose presenting at the anterior end of the middle turbinate and quite high up.

It is not always possible to differentiate inflammation of the frontal sinus from acute purulent inflammation of the antrum or acute purulent ethmoiditis, although the fact that the pus discharge is not influenced by position, is constant in amount, appearing after being wiped away, will lead to the suspicion of its coming from the frontal sinus.

Treatment.—The acute inflammation usually takes care of itself with the subsidence of the cause; and treatment should be directed to the cause. Internal remedies which reduce inflammation, sprays, and syringing with warm or hot saline solution, produce the best results. In case the inflammation is purulent, the removal of the anterior end of the middle turbinate and the clearing of the neighborhood of all possible obstructions will very likely bring about a cure by itself, inasmuch as the natural drainage of the cavity is downward.

CHRONIC INFLAMMATION OF THE FRONTAL SINUS.

This condition is usually due to long-continued inflammatory processes in connection with ethmoiditis, polyp formation, inflammation of the antrum, or to any cause that has interfered with the natural drainage of the frontal sinus and been productive of more or less inflammation in consequence.

Symptoms.—These are a chronic discharge of more or less foul, usually thick pus, accompanied by more or less pain, headache, and general discomfort in the region of the sinus. Pain on external pressure may or may not be present. It is usually best elicited when pressure is made at the inner angle of the roof of the orbit, *i. e*, on the floor of the sinus. There may be obstruction to nasal breathing owing to polyp formation or to the frequently accompanying ethmoiditis. See Fig. 54.

Diagnosis.—The diagnosis is made by inspection of the site of the nasal discharge in connection with the general symptoms. The diagnosis may be difficult, especially when polyp formation or swelling of all the adjacent mucous membrane is an accompanying feature, as it frequently is. In this case the polypi must be removed and the source of the pus explored until we are certain of its point of origin. With the probe curved in accordance with the natural course of the canal it is sometimes possible to pass it directly into the frontal sinus. While this procedure will in many cases fail it should al-

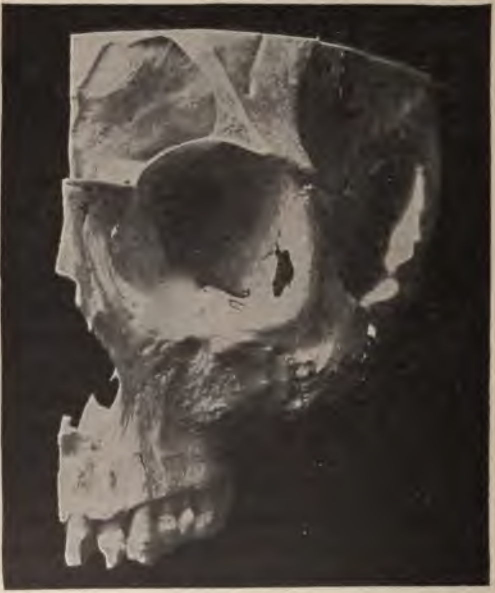

FIG. 54. Large frontal sinus, operation on which at the point advised would have given access to the whole area and to the natural opening down to the nose. Anterior wall removed to show entire area of sinus. (Author's specimen.)

ways be tried. Thorough cocainization and the use of suprarenal solution will help to shrink the tissues and materially aid the procedure. The diagnosis will be helped by the removal of the anterior portion of the middle turbinate. The passage of a probe up into the sinus may be impossible before this is done, and quite possible afterwards, owing to the additional room provided. The method of removal of the middle turbinate has already been given.

After the passage of the probe an attempt should be made to introduce a canula, bent according to the shape of the probe, up into the sinus. Water can then be syringed directly into the sinus, or air blown in, and the appearance of pus at the nasal end of the canal, or the presence of a foul odor, will render the diagnosis certain. The sensations of the patient will be of material aid in determining whether the canula or probe is really in the sinus; since it is very easy to pass the instrument into some of the anterior ethmoidal cells and imagine it to be in the sinus. I have found the sensations of the patient, as to whether the syringed fluid or air were really in the sinus quite reliable in the main, though of course sometimes misleading.

Treatment.—Given a diagnosis what is to be done? This will depend on various circumstances such as the age of the patient, the long standing of the disease, and the desire of the patient for a radical cure. There are two methods of operation—the internal, or nasal, and the external.

The Internal Operation.—This consists in the endeavor to cure the disease through the nose by the establishment of direct gravity drainage as complete as possible, in the way indicated under diagnosis. Remove the middle turbinate and all obstacles to drainage that can be removed, and then carry a canula up into the sinus as far as possible and syringe daily with a cleansing solution. Many solutions have been used. I have found 1-8000 or 1-10,000 corrosive sublimate to be the most efficient. It should be followed by an alkaline douche through the nasal cavities and pharynx, to offset its irritant effect upon the tissues. Argyrol, in 5 to 10 per cent. solution, has proved of service in the hands of several observers. Sometimes a cure seems to be effected in this way, or else the discharge diminishes very materially, and the disease ceasing to be a source of discomfort to the patient he passes out of observation satisfied with a condition in which the odor has ceased and the headache and pain are no longer troublesome. In many persons one has to be content with this method of treatment, which always results in improvement, though not always in an absolute cure.

The External Operation.—When an absolute cure is desired, or when there are symptoms of pressure, continued headache, pus absorption with increase of temperature and symptoms indicating insufficient drainage, the question of external operation should be considered and advised. While if the bone destruction is considerable and the ethmoid cells are extensively diseased, as they may be, an absolute cure may fail or be attained only after a long time, nevertheless in the majority of cases the cure will be complete, there is no appreciable external deformity, the operation is practically devoid of risk, and the period of after-treatment is not extremely long. (Fig. 55.)

Method.—There are a number of external operations, but I shall describe only one, since that one is generally feasible and has more to recommend it than any other. The other operations can be found described in the text-books. The diagnosis being reasonably sure, the eyebrow of the affected eye is shaved and the skin rendered aseptic. A curved incision is then made from just inside the supra-orbital notch along the lower third of the eyebrow region and as far as or a little below the root of the nose. The periosteum is laid bare and the edges of the wound held back by retractors. With a small chisel an

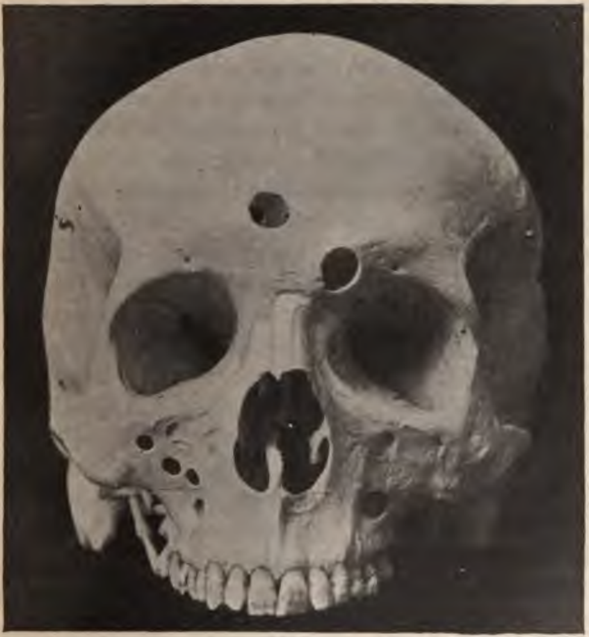

FIG. 55. Skull prepared so as to show sites of operation for empyema of the frontal sinus and antrum. Above on the left side is indicated the best place for opening into the frontal sinus from without—the operation beneath the supra-orbital ridge; while on the right side is shown the site for operation above the supra-orbital ridge, preferred by some operators. On the left side is shown opening through the canine fossa for empyema of the antrum, while on the right side the small openings indicate boundaries of the antrum with reference to the cheek. (Author's specimen.)

opening is now made at about the middle of the incision in the direction of the sinus, and continued until the sinus is reached. The operator will occasionally be surprised at the depth he will have to chisel before reaching the sinus, as the wall is comparatively thick at this point. As soon as an opening is found it should be explored with the probe, so as to be sure which sinus has been opened, since the division line is not always in the middle. The presence or absence of pus and granulation tissue and the character of the mucous lining are next determined. This being accomplished, the opening is enlarged sufficiently to render all parts accessible to the probe or curette, and the sinus curetted or not in accordance with its condition. If extensively degenerated it should be vigorously curetted and all its ramifications followed up ; otherwise considerable diseased tissue will be left behind. As soon as this is done the natural opening into the nose through the fronto nasal canal should be explored with the probe and then enlarged with the curette, so as to make the largest opening possible without injury to any other structures. If the opening with the curette is made outwards and backwards there is little danger of doing any damage, and at the same time the adjacent anterior ethmoidal cells, which are almost always affected, can be reached and opened. As this opening is essential to drainage, and gravity drainage favors rapid healing, it should be made as large as possible. The little finger in the nose will be a guide to the direction of both probe and curette. The bleeding is considerable from this operation, and it is a good plan to place a tampon in the naso-pharynx during the time of the operation, so that all the blood will pass out through the front of the nose.

Shall the external opening at once be closed ?

If one can be sure that all the diseased tissue has been removed, yes. As, however, this is seldom the case, I think it is better to maintain the external opening for one or two weeks until sure that it will be no longer needed. No deformity will result, since the opening, being a curved one, will eventually completely close, leaving hardly any deformity, and what little there is will be completely covered by the new growth of the eyebrow. The external wound has in many of my cases closed too soon, never too late. I have several times been obliged to reopen it, and even to place therein a gold or silver tube. To maintain the opening down into the nose a good sized rubber drainage tube should be inserted, with one end appearing at the nasal entrance and the other at the sinus end, or at the external wound. This should be syringed through daily, and occasionally a new one passed through by attaching it to the old one with a string. This attachment of the new one to the old one must be done thoroughly, or the elastic rubber will not pull through, since nature constantly tends to close the opening. After healing seems well established the tube may be permanently withdrawn.

During the process of healing small sinuses will usually become completely obliterated by the formation of granulation tissue and new bone.

The length of time of the after-treatment will depend on the individual case; from a couple of weeks to some months. If there is extensive ethmoiditis at the same time, the time required for healing will be materially lengthened. In cases of very long-standing sinus disease ethmoiditis is very apt to be present. Syringing with warm saline solution during the after-treatment adds to the comfort of the patient. Reoperation will sometimes be required. I reoperated on one of my cases with double sinus disease three times before accomplishing a cure, but this experience is rare; in fact, double sinus disease is itself rare.

SPHENOID SINUS DISEASE.

Inflammation of the sphenoid sinus is comparatively rare as a primary condition, is difficult of diagnosis, and still more so of satisfactory treatment. When acute it is dependent upon acute rhinitis or some disease process in the neighborhood; when chronic it is usually secondary to an ethmoiditis. In the acute stage the symptoms are those of headache and a full, heavy feeling over and behind the eyes, while when the condition is chronic there is pus discharge with pains in the orbital, temporal or occipital region. Treatment has for its object the establishment of good drainage from the cavity, the natural opening of which is above the posterior portion of the superior turbinate bone in the upper portion of the anterior sphenoidal wall. Like the antrum its natural opening is near the top of the cavity and does not favor good drainage. When it is necessary to open the sphenoid the point chosen should be about one-quarter to one-half inch below the natural outlet and one-eighth inch external to the septum. A good-sized opening should be made, as here as in all the accessory sinuses the openings which are artificially made have a great tendency to close. In cases of sphenoid empyema the symptoms are sometimes very severe, and cases of severe cerebral symptoms and of death are reported. As the disease is one of comparative rarity and not likely to be diagnosed or treated except by the specialist, the reader is referred to the special text-books for further details.

CHAPTER XV.

ADENOID GROWTHS.

(Hypertrophied Naso-Pharyngeal Tonsil.)

The pharyngeal tonsil is an accumulation of lymphoid tissue, of varying quantity, lying in the vault of the pharynx, and influenced in the same subject by age and pathological conditions. A certain amount of it is normally present in every individual. It can be demonstrated in the last months of fetal life, attains its greatest development in the first year after birth, and then gradually diminishes until puberty. It lies in the pharyngeal vault, beginning directly behind the choanæ and going backward as far as the atlas vertebra. It may extend to the fossa of Rosenmüller and the entrance of the Eustachian tube, though under normal conditions it does not usually reach so far. Its surface is irregular, having several grooves, and it is shaped like an inverted hillock. It is part of the tonsillar ring, so-called, which is made up of the naso-pharyngeal tonsil, the two pharyngeal tonsils, and the accumulation of tissue known as the lingual tonsil. The term adenoid tissue is one commonly applied to the naso-pharyngeal tonsil, although in structure the tissue is not an adenoma. The term, however, has acquired usage, and will be used to refer to this tissue.

In character adenoid tissue is of a net-like structure, in which are imbedded numerous lymph cells, the submucosa of which contains many mucous glands. In general it is like other tonsillar structure, though less firm than that of the pharyngeal tonsil. Many theories as to its physiology have been advanced, but none of them are satisfactory; since even the normal quota of the growth can be entirely removed without any apparent loss to the organism, and always with benefit whenever much enlarged. Its value to the organism must be slight or nothing at all; although it may be that under normal conditions the lymphoid tissue aids in keeping the pharynx moist and properly supplied with thin mucus.

Adenoids are brought to the attention of the physician on account of their hypertrophy and the resulting interference to the passage of air through the nose, and on account of the symptoms caused by the interference with proper nasal breathing. Statistics as to their frequency (and the word adenoid is hereafter used to refer to the hypertrophy of the tissue) are so very variable as to be useless, ranging all the way according to various observers from one to 50 per cent. of the cases examined. Perhaps a fair idea of the relative frequency of their appearance may be obtained from the fact that from 10 to 20 per cent. of all the persons attending the average clinic for diseases of the nose, throat and ear will be found to be suffering from adenoid hypertrophy, about evenly divided as to sex. It is essentially a pathological condition of early life, about 70 per cent. of all the cases occurring between the first and fifteenth years; 26 per cent. between the fifteenth and thirtieth years; and 4 per cent. after thirty. These statistics refer, of course, to the ages of the persons examined. It is comparatively seldom that examination for adenoids is made after the twenty-fifth year. They are found in greatest frequency in the ages between the sixth and tenth years; next between the first and fifth years; and then between the tenth and sixteenth years.

Etiology. This seems to have some relation to general hypertrophy of the lymphoid elements as observed in other parts of the body. They are frequently found in several members of the same family, sometimes in all of the children of a family. Heredity seems to have some influence, although this is not usually determinable, since the growths are not as a rule demonstrable in the parents. In many, if not most cases no precise namable cause can be given. A moist climate; especially if accompanied by wind and dust, favors the development of adenoid growths. They are frequently associated with hypertrophied pharyngeal tonsils and with general enlargement of the follicles of the posterior pharyngeal wall.

Pathology. The growth appears in two forms; the most frequent being that of the soft or inverted hillock shaped growth fastened to the vault and posterior wall of the naso-pharynx, usually at its centre, dependent from which hang masses of tissue of varying lengths, not attached to one another, and having the appearance of an aggregation of short strings with a soft feel to the touch, sometimes described as being like that of a bag of worms. (See Fig. 56.) Mucous membrane covers the growth, which is made up of an irregular assemblage of lymph follicles with mucous glands. The other form of growth is flatter, firmer in consistence, and is more uniformly arranged over the naso-pharyngeal wall. The flat form is much less frequent than the hillock shaped variety.

Adenoids seem in many cases to have some relation to the development of tuberculosis, and from a number of microscopical examinations by various observers it was found that some four and two-tenths per cent. of the cases had tubercle bacilli in the adenoid tissue, though this percentage is too small to demonstrate any causative relationship between the two. The adenoid tissue, being highly vascular and of rather a low form of development, would seem to offer a favorable nidus for the growth of the tubercle bacilli, which are probably inhaled to greater or less extent by every person.

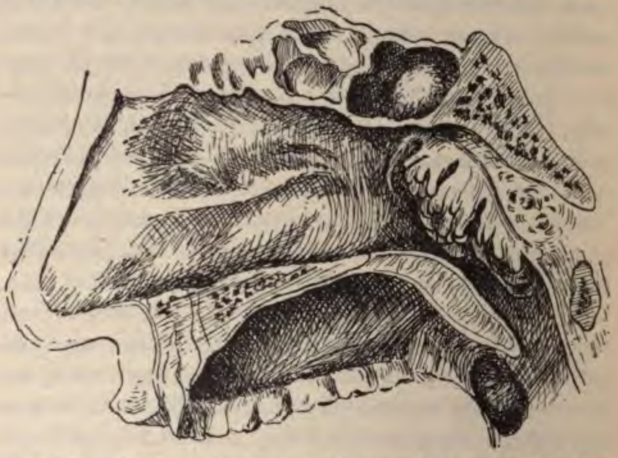

FIG. 56. Antero-posterior section through the right half of the nose and naso-pharynx, showing the presence of adenoid growths. They extend from a short distance above the margin of the soft palate to the vault of the naso-pharynx. The character of the growth, its many projections and the spaces between them are well shown. (After Zuckerkandl.)

Symptoms. Acute. The lymphoid tissue normally in the naso-pharynx may, under conditions of inflammation present in the upper air tract, enlarge considerably and give rise to symptoms of obstruction, fever and general disturbance. As the acute attack passes off the lymphoid tissue again becomes normal, or nearly so, in amount, and may not be a source of future trouble, unless the attacks become frequent and the tissue becomes chronically enlarged.

Chronic. Chronic enlargement may be the result of repeated acute attacks of inflammation in this region, or, what is probably more often the cause, of a slow metamorphosis, in consequence of which the growth becomes permanently enlarged, resulting in the chronic condition of hypertrophy, or adenoids.

The symptoms which the chronic hypertrophy produces are due to the result of mechanical obstruction to the passage of air through the naso-pharynx; to interference with the ventilation of the middle ear by reason of the extension of the growth into the fossa of Rosenmüller and around the mouths of the Eustachian tubes, and to interference with the normal resonating action in speech of the naso-pharyngeal chamber. There being an obstruction to the passage of air through the naso-pharynx, the child is not supplied with a sufficient amount of oxygen; while the air breathed through the mouth, being dry and insufficiently cleansed, is more or less of an irritant to the lungs; the thorax is usually improperly developed; the pharynx and tongue are dry; and the general bodily resistance becomes lowered. Alterations occur in the nasal chambers; the wings of the alæ are small, improperly developed, and tend to fall in, so that the anterior nares appear much smaller than normal; the muscles do not functionate; nor is the space between the septum and the turbinates sufficiently wide; the upper lip becomes shortened, and the ring muscle of the mouth is not sufficiently developed. The hard palate is apt to be narrow from improper bony development of the nose and palate, and may be V-shaped and very high arched—that is, there is a general tendency to a narrowing of all the parts when their function is interfered with.

Ear symptoms may or may not be present, but when present are very marked, either as a progressive diminution in hearing power or in frequently repeated ear-aches. The drum itself may show nothing characteristic, though it has seemed to me that adenoid children with ear symptoms have as a rule a slight reddening of the bloodvessels in the region of the malleus handle, occurring sufficiently often to make the presence of adenoids probable when this is observed. Purulent otitis, both acute and chronic, is frequently caused by the presence of adenoids.

Owing to the inability to use the naso-pharynx as a resonating chamber the voice has a thick tone and is often very indistinct. It is commonly said to have a nasal tone, this being due to the fact that the pure nasal tones, like *m*, *n* and *ng*, cannot be clearly spoken. Disturbances of smell are frequent, and a whole train of other reflexes, such as nervous irritability, backward mental development, sleeplessness, night terrors, wetting the bed, etc., have been found to be dependent upon the presence of these growths.

Diagnosis. This is made from the general symptoms as just outlined, and from the facial appearance, persons afflicted with adenoids having a peculiar appearance, due to the fact that they go about with the mouth open, and that the nose is apt to be foreshortened, owing to its lack of development. (See Fig. 57.) The person frequently has a dull, stupid look, most marked in cases in which the ears are afflicted and the hearing is bad. When the growth is very abundant the amount of secretion is considerable, appearing both on the pharyngeal wall and in each nostril. It is of a slimy, muco-purulent character, and the affected individual is unable to blow the nose, or, as a rule, to breathe through it; although adenoids may be present in considerable amount and the person be able to breathe, during the daytime at least, through the nose. At night the mouth is more widely open; the child has an uneasy, snoring sleep, and is frequently dyspneic, often to such an

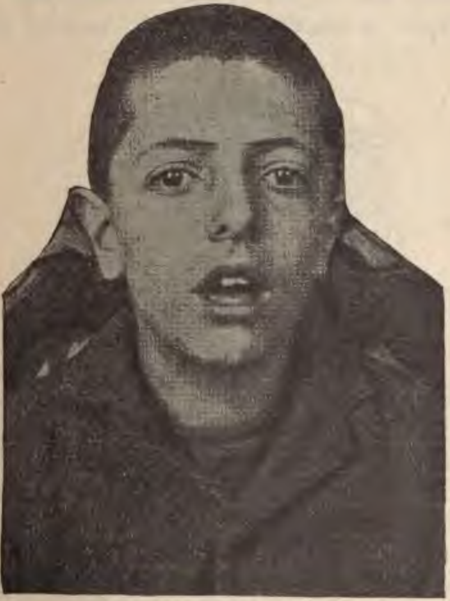

FIG. 57. Child with adenoids, showing characteristic facial expression. (After Gradenigo.)

extent as to cause it to spring up suddenly in sleep as though gasping for breath. These symptoms of disturbed sleep are nearly always present when the growth is considerable in amount.

The diagnosis is made certain by anterior and posterior rhinoscopy and by palpation with the finger. Anterior rhinoscopy sometimes shows the presence of the growth, but is not reliable, as in the worst cases the nose is so blocked by mucus and by swollen or hypertrophied turbinates that this method is not practicable. Posterior rhinoscopy is practicable in adults; seldom in children; and in children under ten years of age it is hardly worth attempting. In the rhinoscopic mirror the growth usually appears smaller than it really is, as the accompanying cuts from Zarniko show. (See Figs. 58, 59, 60.) The palate may be lifted, but the growth is not usually visible, as the use of the palate hook causes a powerful contraction of the adjacent palatal muscles, and the examination as a rule results in failure. In young children, after a probable diagnosis of adenoids has been made from the symptoms and general appearance, the diagnosis is best confirmed by palpation with the index finger of the right hand; and although disagreeable to the child and probably frequently painful, it can be done so quickly, and the information which it gives is so certain, that in all cases of the slightest doubt it should be made use of. The detail is as follows:

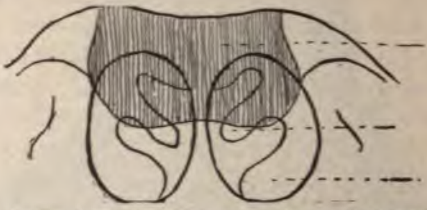

FIG. 58. Adenoid growth as seen in the post rhinoscopic mirror, much smaller than it really is. (After Zarniko.)

Palpation with the finger should be done as the last thing in an examination. The child is seated on a stool or in the lap of a nurse, who looks out for his feet and hands. The operator protects the finger by means of a sterile finger cot or prepares his finger by thorough cleansing with soap and water, and then by scrubbing the nail with corrosive sublimate, afterwards rinsing it off with warm water. He now puts his left arm, in the hand of which he holds a tongue depressor, around the child's head, and, asking the child to open the mouth while he feels for a moment in his throat, slips the handle of the tongue depressor as far back along the teeth as possible, and then introduces the forefinger of the right hand, around which he has placed a napkin, into the mouth, depresses the tongue at its base, feels for the tip of the

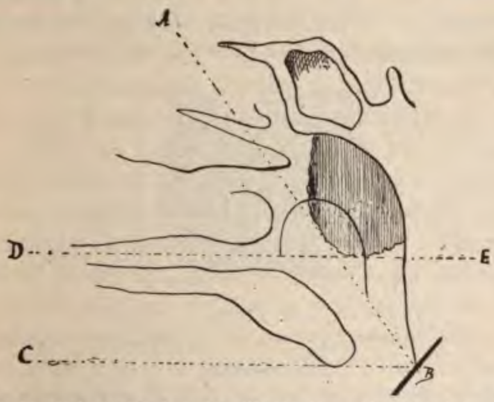

FIG. 59. Schematic drawing illustrating why the picture of an adenoid growth as seen in the rhinoscopic mirror represents the growth as smaller than it really is. C-B represents the mirror in position. Its picture represents the area embraced by the line A-B and its vicinage. Only the anterior and inferior portion of the growth would be visible and the mirror picture would correspond to Fig. 58. D-E represents the floor of the nose and the lowest limit of the growth. (After Zarniko.)

uvula, and slips the forefinger behind it up into the naso-pharynx. The finger is then carried swiftly over all the area as far as the vault, into each choana, into the fossa of Rosenmüller, around the mouths of the Eustachian tubes, and then withdrawn. The whole procedure has taken but a few moments, while the character of the growth, its density, its extent, its position and its form have all been quickly determined. A little bleeding usually follows, owing to the soft nature of the growth, but this is but momentary. The child cries for a minute, and the procedure is over. No reaction follows.

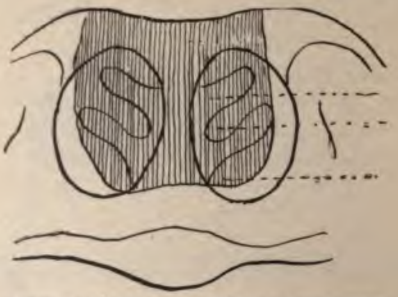

FIG. 60. Showing the real size of the adenoid growth the post-rhinoscopic picture of which is shown in Fig. 58. (After Zarniko.)

Prognosis. These growths have a tendency to disappear around the age of puberty, and, as statistics show, are comparatively rare in adult life; but the damage which they do occurs in childhood and is not relievable after the period when they would naturally subside. Purulent otitis media, with permanent deafness, with destruction of the drum and ossicles, and with all the symptoms which follow in its train, may be caused by the adenoids, and this condition be left long after the adenoids may have grown smaller. The mouth-breathing habit becomes acquired; the high-arched palate remains; and the dangers from bad throats present in the diseases of childhood, such as measles, scarlet fever and diphtheria, become greatly intensified. Hence, in response to the question, will the child outgrow the adenoids? the answer may be, yes, to a certain extent; but the damage they do can never be outgrown, but will remain as a permanent injury. The treatment then becomes of imperative importance.

Treatment.—In children with occasional acute attacks of inflammation of the adenoid tissue in the pharyngeal vault, who breathe normally at other times, have no ear symptoms, and are otherwise healthy, palliative treatment may be of use; and it is probably true that under the influence of the iodides the growths do, in a measure, subside. Whenever, however, there are positive symptoms connected with either the ear or voice, or interference with breathing, especially if these are present when the person is otherwise in good health, there can be but one treatment to be considered, and that is, removal by operative procedure; and this is usually to be recommended in the cases which are brought to the notice of the physician. The operation should never be done under acute conditions.

Operations.—The operation with the finger-nail has been advocated by many observers, it having been claimed that as the adenoids are soft, they can be scraped away without much pain by the sharpened nail of the forefinger, and without an anesthetic. To my mind this is unscientific, unsurgical, and incomplete, whenever the growth is of any extent, the finger-nail in that case serving only to tear up and injure the vault of the pharynx, without removing the growth. I, therefore, condemn the finger-nail operation, except under one condition. It occasionally happens that in very young children the examining finger finds a few adenoids, hardly sufficient to be very obstructive or to appear to warrant an operation. It is my custom under this condition to press several times down and up the naso-pharyngeal wall with the back of the finger-nail, crushing out the pulp from the few adenoids present. This does not tear the tissues, produces but slight bleeding, and in properly selected cases is effective. It is in no sense an operation for the removal of adenoid growths. I condemn also the so-called artificial finger-nail, which is worn on the end of the natural finger and used as a kind of gouge or scoop to dig away in the naso-pharyngeal wall. It will remove some of the adenoids, but not all, unless it is used several times and at the risk of more reaction than would be obtained by better methods.

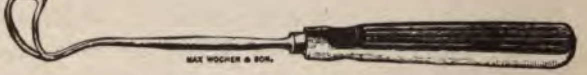

FIG. 61. Gottstein's adenoid curette.

Adenoid growths can be thoroughly removed in a surgical manner by some one of the many cutting curettes or cutting forceps, the former after the types of Gottstein (see Fig. 61) and Beckman, and the latter of the type of Loewenberg (see Fig. 62) or some one of its many modifications.

Shall the operation be done under general anesthesia or with cocaine? Notwithstanding the many statements that the removal of the growths is not painful, and that they can be removed without the necessity of anesthesia, it is my own conviction that children under fifteen years of age should, in the majority of instances, be operated on under anesthesia, since that alone gives sufficient time for the thorough removal of the growth; and why more than one sitting should be taken to perform an operation of this kind, I fail to see. Under two years of age the risk of the anesthetic may be such that it may be better to hold the child and perform the operation; and over fifteen years of age it is possible to sufficiently anesthetize the naso-pharynx with strong solutions of cocaine as to render the operation nearly painless.

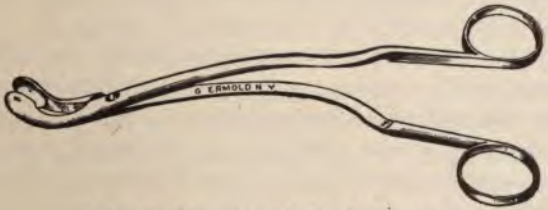

FIG. 62. Löwenberg's adenoid forceps.

It is, however, almost invariably my own practice to resort to general anesthesia, except in the case of adults, on whom under cocaine the operation can frequently be done with no more pain than the individual will comfortably stand. Since the introduction of the adenotome of Shütz, an instrument based somewhat on the principle of the tonsillotome, the operation can be performed on adults with comparative ease. The naso-pharynx being thoroughly cocainized, the instrument is introduced behind the soft palate, pressed against the growth, and the cutting blade made to pass over the growth. This usually comes out in one piece. The instrument is again introduced on the right and left and the operation is finished. In adults with a good, roomy naso pharynx the operation of removal can be ideally done with this instrument. It is not applicable for children, nor even for adults whose power of control is not fairly good.

As to the choice of an anesthetic, having had one unpleasant experience with chloroform, and there having been several deaths reported from its use in these operations, I now invariably employ ether. In an experience of several hundred adenoid operations, with the ether given by experienced and inexperienced persons, I have never had the slightest cause for fear as regards the anesthetic; and this fact alone counterbalances the difficulties of giving it, even though, owing to the hampered respiration, the patient is apt to take the ether rather poorly, and the congestion and consequent hemorrhage are greater. Nitrous oxide gas has been used, and in the hands of an expert anesthetist, and with a rapid operator, it is certainly an ideal anesthetic for this operation; as, however, it requires considerable apparatus and must be administered in the office, it is not so readily available for the average practitioner as ether. With bromide and chloride of ethyl I have had no experience.

The operation may be done with the patient on the back with the head hanging over the edge of the table, or in the upright position held by a nurse. As I like as good vision as possible in all operations, and wish to see where the blood is coming from and how much there is, I invariably, except in the case of an adult too large to be held, operate with the person in the sitting posture in the lap of a nurse, and in the following manner:

Selecting a room with preferably a north light, the floor is prepared by covering it with a sheet.

The operator's chair is placed with the back to the window, with the chair in which the nurse is to sit directly in front. On a table to the left is placed a sterile towel, on which are laid the desired instruments and a number of good-sized pledgets of either gauze or absorbent cotton. For the ordinary house operation I carry, together with the instruments for tonsillotomy in case the tonsils are to be removed also, the following instruments: Several hemostats, long and short; a cutting adenoid curette of the Gottstein or Beckman pattern, and usually a pair of Loewenberg forceps; a palate hook; a good mouth gag; and a tongue depressor. Have ready also a bottle of peroxide of hydrogen and a pan containing some weak bichloride solution. The child is etherized in bed, and then put into the arms of the nurse, whose chair is now drawn forward so that the operator's knees encircle hers; the patient is now practically fixed from the waist down, while the head lies upon the right shoulder of the nurse. The etherizing physician holds the mouth gag. Ether is administered to complete anesthesia, and this usually suffices for the entire operation without the necessity of giving any more, though when both tonsils and adenoids are removed, as is usually the case, it may be necessary to give a little more ether, especially if the tonsils should prove at all troublesome from hemorrhage. The mouth gag having been inserted, the tongue depressed, and the palate elevated, the child's head is directed by the nurse toward the window in such a way that the light will fall directly into the throat. The lower portion of the adenoid tissue will be visible when the palate is lifted. It is my custom, after the child is placed in the arms of the nurse, to place a sterile towel in front of the child, one in front of my own gown, and another in the lap of the child.

Everything being ready, the left forefinger is inserted into the naso-pharynx as a guide, while with the right hand the Gottstein curette is introduced as high up and as far forward as possible, and then with a rapid sweep, whereby the whole pharyngeal vault is swept by the instrument in the downward direction, the central mass of the growth is removed.

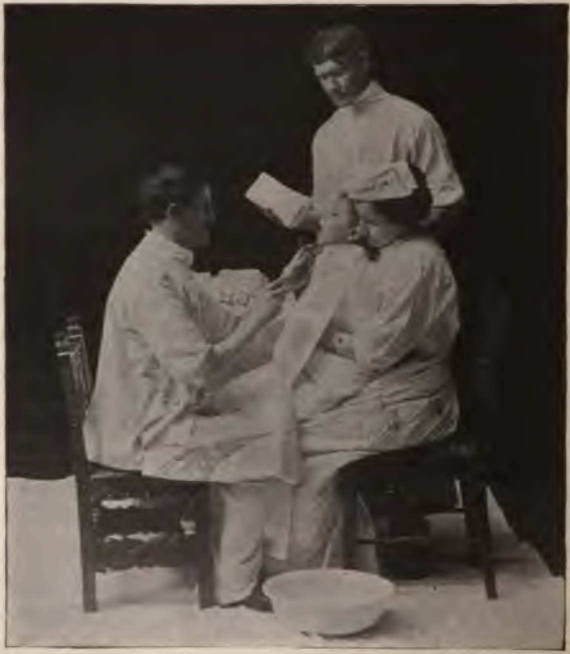

Fig. 63. Position of operator, assistant, nurse and patient when the adenoid operation is done in the upright position. The table, with all the necessary instruments and other things, is at the left. The assistant has removed the ether cone. The mouth gag has been placed in position, the tongue depressed, and everything is ready for the insertion of the instrument. The light, preferably from a north window, is directly behind the operator.

The instrument is then reintroduced, first to the right and then to the left, and several times swept rapidly over the surface, to be sure no remnants are left behind. The bleeding is now profuse, and the moment the operator ceases work the nurse turns the child's head to the left, where a bowl has been placed to catch the blood. With the mouth gag still in position the child is quickly brought back to the upright position, and a hemostat armed with a pledget of cotton or gauze is carried into the naso-pharynx and held there a moment. This staunches the blood to a certain extent. The finger is now introduced to feel if any portions of the growth are left, special care being taken to feel in the region of the Eustachian tube, and if so, the curette is reintroduced until the entire area is clear. At intervals the child's body is turned sideways, so that the blood will not flow into the larynx, and the cotton pledget or gauze several times carried into the pharynx. The bleeding is apt to be profuse for a few seconds, but quickly subsides. In case it should last longer than is desirable the cotton pledget is easily carried up behind the soft palate and maintained there for a sufficient length of time. When the Loewenberg forceps is used, the procedure is practically the same, the forceps being introduced each time under the guidance of the finger, and the various portions of the growth removed by grasping them with the forceps. In using the Loewenberg forceps care must be taken not to catch the uvula between the blades. It is a good plan always to use the Gottstein curette after the forceps, as it will sweep the whole surface to the vault rather better than the forceps. Finally, the finger is carried rapidly over the whole area, and any small portions of the growth that may still be present are crushed under the nail, or if too large for that, sought for with curette or forceps. Special care must always be taken to clear the region of the Eustachian tube of all portions of growth, no matter how small, as if this is not done the operation may fail in accomplishing its full benefit for the ears. As the Eustachian tube eminences are on the side, there is little danger of injuring them with the cutting curette or forceps, since these have no side-cutting edge. It will sometimes happen that some bit of tissue will be cut but not entirely detached, and will hang on the nasopharyngeal wall; hence this should always be

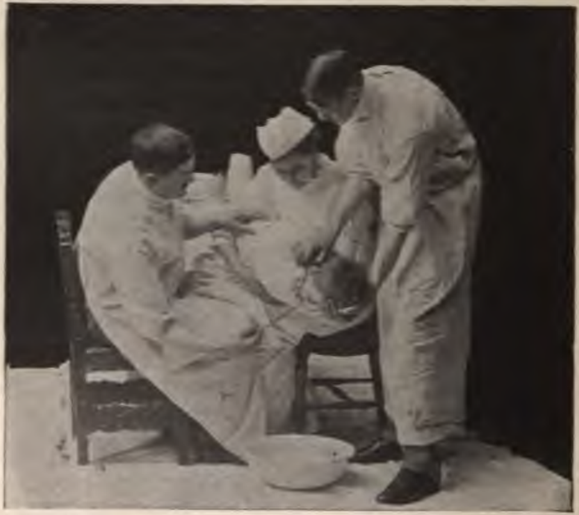

Fig. 64. Second position, adenoid operation. The adenoids being removed, and the gauze or cotton tampon inserted in the nasopharynx, the child's head is thrown forwards as indicated, and the blood drops into the bowl. The mouth gag is maintained in position and the head held by the assistant, while the nurse has entire control of the patient's body, so that the upright position can be resumed in case the operation is not entirely finished, or for any examination.

looked out for, and if present cut away with a pair of curved scissors or Myles' tonsil punch. It should never be torn away, as it is not desired to remove the mucous membrane of the pharyngeal wall but the adenoid growth ; nor should the adenoid forceps be used with any other intent than to remove the hypertrophied growth; hence the direction of the cutting instrument and the force applied should not be such as to gouge out the underlying mucous membrane and submucous tissue. Cutting curettes with a spear-shaped edge are therefore never admissible. The edge should be straight, or slightly curved and attached to the shank, so as to cónform to the natural curvature of the pharyngeal wall.

In case the sitting posture is inadvisable, as is usually the case with adults to whom an anesthetic is given, the operation is done with the patient on a table, with the head over the edge, so extended that the naso-pharynx will be lower than the entrance of the larynx. The blood flows out of the nostril and mouth during the operation, but is not swallowed or inhaled. Some operators prefer this position for all adenoid cases.

The operation over, and the bleeding staunched, the child is laid in bed. Instructions are given for liquid diet and for keeping the child in bed for a day or two. Sprays and such like for after-treatment are unnecessary. I formerly used them, but the cases do just as well without. The parents are told that the child will probably vomit some blood. In the case of children who have been unable to breathe properly at night the immediate relief which follows the operation is very gratifying. From the noisy, stridulous, uneasy sleep which has alarmed the parents, the condition is changed to one of quiet, and I have been often told by mothers that they had gotten up in the night with the fear that the child was not living, because the breathing was so quiet as compared with the former condition that they were alarmed for fear the little one was not breathing at all. In two or three days the child has entirely recovered and is greatly improved in every way, since there is hardly any operation in the range of surgery which produces such immediate results in the way of improved hearing, improved breathing and improved speech, and in which the after-reaction is so slight.

The evening of the day of operation there is usually a little fever, seldom, however, rising above 100. For this a minute dose of aconite and morphia, repeated as needed, may be given.

It will occasionally happen that the child will suffer from an acute earache following the operation, owing to the entrance of blood into the mouth of the Eustachian tube or to inflammatory reaction causing closure of the tube. This is not usually severe in character, and occurs but seldom; I have, however, seen it. Tincture of aconite in small doses, morphia, and heat to the ear, usually cause the inflammation to subside rapidly. If the operation is done in the hospital the child can usually be taken home the evening of the same day.

A few cases of hemorrhage occurring some hours after the operation have been reported. I have never seen one, and compared with the number of operations which are done, this factor can, as a rule, be disregarded; though information should always be sought as to the presence of a tendency to bleeding, and in case of bleeders operation declined. Operation should never be done when the patient is suffering from any acute trouble. In suitable cases, and when properly and thoroughly done, I know of no other operation of childhood which gives such brilliant results.

It should always be stated to the parents or friends that the nose-breathing habit will not be immediately established, even in cases in which all mechanical obstacles have been removed, since the new habit of nose-breathing will have to be formed. Volition being suspended, nose-breathing during sleep will not be the rule until it is the common habit when the person is awake, and done as an unconscious rather than a conscious action. The younger the child the longer it will take to establish the proper habit.

CHAPTER XVI.

AFFECTIONS OF THE FAUCIAL TONSILS.

Situated at the sides of the pharynx, close to the entrance of both the trachea and the esophagus, the tonsils are peculiarly liable to various diseased conditions.

Their anatomy and physiology have already been briefly described. Concerning the latter there is a great divergence of opinion. Some authors of large experience hold that any degree of tonsil is pathological; others maintain that any tonsil more than a very small gland, lying between the anterior and posterior pillars, and forming a part of the general lymphatic ring composed of the faucial tonsils, the lingual tonsil and the naso-pharyngeal tonsil, is pathological; while still others regard the tonsil as a gland of considerable value in the economy, having as its principal function the secretion of pharyngeal mucus, and having something to do with the production of white blood corpuscles and lymph. In addition, recent investigations have conclusively proved that it has some absorptive power. This is confirmed by the clinical manifestations of tonsillar inflammation, in which the intense prostration is often out of proportion to the appearance on inspection. As a matter of fact, its physiology is still imperfectly understood; and it seems to be perfectly compatible with normal health that a person should have either no tonsil at all or a large tonsil, so long as the gland is not affected by disease.

The tonsil is subject to and liable to be invaded by, the various inflammations which have their seat in the larynx, pharynx, mouth and trachea. While the affections of the tonsil have been very much subdivided, and are sometimes given a most elaborate classification, they may for all practical purposes be divided into acute and chronic. The acute may be divided into acute parenchymatous or general tonsillitis, and acute lacunar tonsillitis, with the further subdivision of the lacunar type into acute croupous or membranous tonsillitis. Among the acute inflammations is also included acute inflammation of the region surrounding the tonsil—circumtonsillar inflammation, or peritonsillar abscess. It is this latter condition which is commonly known as quinsy. The chronic affections are divided into chronic lacunar tonsillitis and chronic parenchymatous inflammation or the hypertrophied tonsil. Under this latter head will be considered the surgery of the tonsil.

ACUTE PARENCHYMATOUS INFLAMMATION OF THE TONSIL.

Acute Tonsillitis.

This is an acute inflammation of the substance of the tonsil, accompanied by swelling, pain, fever, and increased mucous exudation. It may precede or accompany certain of the infectious diseases, and may even be suggestive of the prodromal stage of some of them, as for instance, scarlatina or measles. The onset is more or less sudden. There may be chilliness followed by sore throat, rapidly growing worse; fever which may range as high as 104; increased pulse; difficulty in swallowing; general prostration, frequently extreme and apparently out of proportion to what is to be seen on inspection of the throat; interference with taste and smell; headache; muscular pain. Pain in the ears and deafness may be complained of, owing to the inflammation passing up toward the Eustachian tubes. The rapidly accumulating mucus causes a constant desire to swallow, which act is very painful. There is a coated tongue and offensive breath. Uncomplicated, the disease runs a course of from two or three days to a week, when it subsides, and healing is complete. If the fever is very high and persistent, sometimes a slight erythematous rash is present. On inspection, the tonsils, anterior and posterior pillars, and the pharynx, are all seen to be swollen, while in color the throat is a livid red. As a rule, both tonsils are affected, or if one alone is at first affected, the inflammation is very apt to pass quickly to the other. When the inflammation has finally subsided the tonsil is often left larger than it was before; and repeated attacks of this form of tonsillitis finally produce chronic hypertrophy. The diagnosis seldom presents any difficulty.

Treatment is very satisfactory if it can be undertaken early and is sufficiently positive. The patient should be promptly put to bed. Remedies should be those which produce free perspiration and allay pain; together with soothing antiseptic sprays, either aqueous or oily, and frequent gargling with warm weak alkaline solutions. The following day, remedies which relieve the general aching, such as the antirheumatics, are especially valuable. It is my own practice when I can see such a case early to give the ordinary tonsillitis tablet, the formula for which is as follows:

Tinct. aconite	1-5 min.
Tinct. belladonna leaves	1-10 min.
Tinct. bryonia	1-10 min.
Mercuric iodide, red	1-100 gr.

This should be given every fifteen minutes for two hours, and then every half-hour for three hours more. At the same time is given five grains of salicylate of soda once in two hours, for four doses, and every four hours thereafter as long as fever and general aching continue. In addition I usually give six to eight grains of quinine in divided doses, and a little morphia if the pain seems to demand it. Guaiac was formerly much in vogue, and the ammoniated tincture of guaiac in one-half to one teaspoonful doses in hot milk every two hours frequently acts extremely well in cases of acute tonsillitis. It is, however, so disagreeable to the patient, and is so frequently vomited, that I find myself using it less and less. The day following the acute attack the temperature is usually very nearly normal, and the after-treatment consists in simply keeping the throat clean, looking after the general health, and applying local remedies to allay inflammation.

Acute Lacunar Tonsillitis.

Called also Acute Follicular Tonsillitis.

This form of tonsillitis differs from the preceding in that the inflammation extends deeper, affecting not only the parenchyma of the gland, but having its special seat in the individual crypts, or lacunæ, which become filled with a purulent exudate that soon pushes its way upwards and is visible at the surface of the tonsil. This exudate is of a fibro-plastic nature, and contains streptococci or staphylococci. This type of tonsillitis is very contagious, and frequently affects several members of a family.

Its cause in the first instance is, perhaps, exposure to cold, or anything that lowers the general resisting power of the organism. I have several times seen it follow the use of the galvano-cautery in the throat. It is more apt to occur in persons who have had previous attacks of tonsillitis, whose crypts are never thoroughly cleaned, and in whom any exciting cause seems to start up an attack of inflammation. One or both tonsils may be involved, but there is not so much likelihood of both tonsils being invaded as in simple tonsillitis. The exudate sometimes seems to coalesce, but usually comes from individual lacunæ, and the tonsil appears to be studded with white or grayish points of irregular size.

The clinical symptoms are much the same as in the preceding variety, but the course of the disease is apt to be much more prolonged.

Its treatment is much the same, with the addition especially of antiseptic fluids, such as peroxide of hydrogen, which when freely applied either in the form of a spray or as a gargle seems to be of great aid in lessening the degree of local inflammation and in hastening recovery if used early. The tincture of chloride of iron and twelve to twenty per cent. solutions of nitrate of silver applied locally seem to have value in aborting the disease. The following formulae are also highly recommended:

℞	Morphiæ	9-16 grain.
	Tr. verat. virid	1 dram.
	Aquæ	4 oz.

Teaspoonful hourly for three hours; then every three hours for twenty-four hours.

℞	Tr. ferri chlor	1 dram.
	Glycerini	2 oz.

One dram every two hours.

The thorough cleansing of the area, or the opening of the crypts under cocaine with the Leland tonsil knife, if they seem to be at all blocked, is also of value in aborting the disease. While the difficulty in swallowing is considerable, and the pain and glandular swelling frequently extreme, there is usually little if any danger; and as a rule the mouth can be opened sufficiently for the application of the necessary remedies. Guaiac and red gum in the form of lozenges, or other simple astringents, are an aid in restoring the tonsil to its normal condition. The following formula makes a cleansing, stimulating gargle, and will be found useful in exudative tonsillitis as well:

℞	Acid. carbol	1 dram.
	Glycerini	3 oz.
	Tr. iodi	4 oz.
	Aquæ	q.s. 1 pint.

ACUTE EXUDATIVE TONSILLITIS.

This is a modified form of the preceding disease, and has in many respects some similarity to diphtheria. Diagnosis is at times so difficult that nothing but a bacteriological examination can determine with positiveness which disease is present, although the fact that the exudative tonsillitis is almost invariably limited to the surface of the tonsil and has no inclination to pass up along the pillars or to attack the uvula is usually sufficiently diagnostic. In this form of tonsillitis there is an exudation from the crypts, which coalesces and forms a fibrino-plastic layer covering the entire tonsil. This exudation is whitish in appearance, not as dirty-grayish as in diphtheria, is removed with comparative ease, and does not leave an ulcerated surface, although it quickly reforms. The temperature is higher than in the initial stage of diphtheria, but quickly becomes normal, while the general prostration is not so extreme, although it may be more than in simple lacunar tonsillitis. The tonsil itself may be but little swollen, and the exudate, if starting on one side only, will usually affect the other tonsil before the disease is over. The disease tends to run a course of from one to two weeks, and leaves the patient weak and anemic. Strict precautions in regard to antisepsis should be taken, and besides the ordinary antiseptic washes a stronger antiseptic, as bichloride of mercury 1-2000 or peroxide of hydrogen full strength or diluted, should be used at hourly intervals. Much more agreeable than the bichloride, and perhaps as efficient, is a solution of hydrogen peroxide diluted with one of the many alkaline antiseptic fluids. Tonics and constitutional measures are indicated at the same time.

Both lacunar and exudative tonsillitis are in all probability contagious, and should be treated accordingly. Rheumatism has so often occurred in those who have a tendency to tonsillar inflammation that attempts have been made to show some causative relationship between the two affections. It has been supposed that the rheumatic poison is absorbed by way of the tonsil; this can hardly be considered proven as yet so far as rheumatism is concerned, although endocarditis may be of tonsillar origin.

CIRCUMTONSILLAR INFLAMMATION

Peritonsillar Abscess, Quinsy.

Of all the affections of the tonsil this is the most severe, being an inflammation not so much of the tonsil itself as of the structures around it, accompanied as a rule with formation of pus, and producing its symptoms on account of the deep-seated nature of the pus and the time required and the difficulty experienced in effecting its exit. The usual causes of tonsillar inflammation are probably contributory, but it seems also to occur occasionally in connection with constitutional conditions apart from any local cause. It occurs also as a result of the blocking of the tonsillar crypts and infection by absorption through the adjacent lymphatics of products which in the usual forms of tonsillar inflammation discharge themselves through the crypts. Both streptococci and staphylococci are found in the pus, the streptococci most frequently; both may be present. It is usually limited to one side, and is accompanied by swelling of the entire tonsillar region, with pushing of the tonsil forward and toward the middle line, involving also all of the adjacent connective tissue and the glands of the neck, and interfering with the opening of the mouth to such an extent that when the condition is at its height it is almost impossible for the mouth to be opened, owing to the inflammation of all the structures around the muscles of the jaw.

Pathologically, it is due to inflammation of the cellular tissue around the tonsil. While the suppurative process occasionally invades the tonsillar substance, as a rule it does not. The tonsil is pushed out of its place as a result of the inflammation, which usually goes on to pus formation, having a history of from six to nine days from its onset before the pus works its way out of its own accord. The pus usually finds its way into the space formed by the top of the tonsil and the two pillars, called the supratonsillar space. This varies greatly in its depth, and is behind the palato-glossus muscle. Abscess cavities are sometimes found at the base of the tonsil, but rarely; as a rule they are above and to the outer side of the tonsil, and the tonsil will be found pushed towards the middle line. The soft palate is pushed forward, the swelling in the fauces is extreme, the uvula becomes edematous, and the respiration may be obstructed. Although only one tonsil may at first be affected, the other may become so later. At times the pain and discomfort in swallowing and in moving the jaw are much greater than the apparent swelling in the throat seems to warrant, and in such cases the pus will be found very deep. Pain and difficulty in swallowing and in speech, and the general constitutional disturbances, are more marked than in any other of the tonsillar inflammations.

Treatment should, if possible, be abortive, but when a true peritonsillar inflammation has begun it is usually ineffective; and nothing suffices but a free opening with the knife down to the supra-tonsillar fossa or to the pus area. In the later stages this becomes almost imperative, even though nature will usually force the pus out; yet the suffering is so extreme that an attempt should always be made to open the abscess. Such attempts frequently result in failure, the only result being the letting out of a little blood and the causing of pain to the patient. In opening an abscess it should be remembered that in almost all instances it is not in the tonsil but behind and above the tonsil, and that, therefore, the knife must be inserted deeply, and the incision made large enough to provide free drainage and give relief.

The diagnosis of peritonsillar abscess being made after thorough examination with the aid of good illumination of the throat, the operation can be done either before a good light or with the aid of artificial light and the forehead mirror. The first thing to do is to find, if possible, the place where the abscess will naturally point. With the point of a probe go carefully over the whole swollen surface, and ask the patient to tell when any especially sensitive spots are touched. In a few moments these sensitive spots can be narrowed down to a small area, and this is the place where the abscess is nearest to the surface, and is approximately the point for incision. Usually this point will be found to be midway between a vertical line drawn from the last molar tooth, that is, the gingivo-palatal fold, and the edge of the anterior pillar, which is usually pushed away towards the middle line, and at a point a little above or at about the top of the tonsil.

Anesthetize the parts with cocaine, rubbing them three or four times until the sensation is abolished. I have found a little powdered cocaine applied on a small moist applicator, to produce more complete anesthesia than the solutions. Have ready a small, sharp, straight or curved scalpel, guarded with cotton except for its terminal half inch, and cotton or gauze for use in case there should be hemorrhage, and a syringe. Have someone sit by the patient and hold the hands. Hold the tongue down with a good tongue depressor, so that all the room available is obtained, and make the incision directly backwards, with the knife pointing downwards, or downwards and inwards, and keep on until pus is reached, going half an inch deep if necessary, though pus will usually be found at a less depth. When pus is found enlarge the incision as the knife is withdrawn, so as to leave a free, gaping opening; it will close as quickly as a smaller one, and drains much better. The cut can also be made upwards if necessary. The knife will usually seem to be in a cavity, which must be freely drained. The bleeding will be profuse for a few moments, as all the tissues are gorged with blood and the natural tonicity of the vessels is in a measure lost. It may happen that the bleeding continues more profuse than is desired. In this event a pledget of cotton or gauze soaked in pure peroxide of hydrogen can be introduced directly into the pus cavity, and will quickly check the bleeding. I once had troublesome hemorrhage after opening an enormous pus cavity, in which,to be sure of complete drainage, I cut downward a little too far, severing a small vessel which bled profusely. In this case I packed the cavity with a number of cotton pledgets soaked in peroxide, and no further trouble resulted. After opening it is a good plan to syringe out the pus cavity with warm sterile water or with peroxide and water. Simple cleansing measures for a day or two is all that is needed for after-treatment. Occasionally the incision will be made before the pus appears. When this occurs the incision will usually give relief, and when the pus appears a day or two afterwards it evacuates itself through this opening. It will, however, only rarely happen that an attempt at incision will be made ahead of the actual formation of pus. In my own experience with failures it has usually been that the incision was not made deep enough or else that I failed to find the pus cavity. An incision made at the point suggested is usually free from danger of wounding any vessel of considerable size, and if such should be wounded the hemorrhage is easily stopped by packing in the manner suggested. When spontaneous evacuation takes place it will usually be between the pillars and just above the tonsil.

CHRONIC LACUNAR TONSILLITIS.

The tonsillar crypts are frequently the seat of chronic inflammation, whereby they produce a whitish, thick, cheesy deposit which contains many micro-organisms and is usually of a disagreeable odor, and which slowly works its way out to the surface and is spit out. Sometimes the person afflicted is not conscious of these deposits; at other times they are a source of great annoyance, and relief is sought on their account.

The treatment consists in the removal of the entire affected gland or else in the destruction of the individual crypts by means of the chemical caustics, as acid nitrate of mercury, chromic acid, trichloracetic acid, or nitrate of silver fused on a probe; or the individual crypts can be destroyed by cutting them out with one of the various tonsillar cutting forceps or with the galvano-cautery. Nothing but the destruction of the crypts can do any good.

MYCOSIS OF THE TONSIL.

This is a chronic affection of the tonsil, somewhat allied to the preceding disease, and often mistaken for it. It affects, however, not only the tonsil but the follicles in the pharynx and at the base of the tongue as well. It is comparatively uncommon, of slow growth, and chronic. On inspection, here and there over the surface of the pharynx, the base of the tongue, and the mouths of the follicles of the tonsil, will be seen little pearly-white elevated tufts, distinct and separate, rising above the surface of the epithelium. Removal by forceps is usually impossible, as they cling tenaciously to the structure, and considerable force is required to pull out one of the plugs, and on removal the growth quickly reappears.

The growth is of fungus origin, and contains leptothrix and bacillus fasciculatus. There are also well-marked mycelia within the mass, and more or less degenerated secretion and dried mucus. The process naturally tends to extend.

Its cause is uncertain. In my own experience it has usually occurred in persons of good health, and who frequently were not aware of the condition until their attention was brought to it. Occasionally the general odor of the breath seems to be bad, but whether the mycosis is the cause of this or not I have been unable to determine.

The only treatment that is of any value is to destroy all of the fungoid growth, and to do this the crypt from which it grows, whether in the pharynx, tonsil or base of the tongue, must be destroyed. I have found the use of the cutting forceps followed by the galvano-cautery to be the most efficient method of destruction, while the curette followed by chromic acid will probably accomplish the same result, but a longer time will be required. The cases seen have occurred more frequently in females than in males.

Chronic Parenchymatous Tonsillitis.

Hypertrophied Tonsils.

Repeated attacks of acute tonsillitis tend to chronic enlargement of the tonsils; since with the subsidence of each attack the gland is larger than it was before; and as it enlarges, adhesions to the anterior and posterior pillars frequently form, and the mobility of the pillars becomes lessened. The tonsils frequently enlarge in the process of growth in children who are otherwise apparently healthy; so that many children who have never had true tonsillitis do have very much enlarged tonsils. Those who suffer from enlargement of the whole glandular chain in the neck are quite likely to have very large tonsils, and this is especially true in the case of children. There is also a close relationship between the component parts of the entire tonsillar ring, so that hypertrophy of one is frequently accompanied by hypertrophy of another portion. This is especially true of adenoid and tonsillar hypertrophy; so that most children, though by no means all, who have hypertrophied tonsils are very apt to have adenoids as well, and those suffering primarily from adenoids to have hypertrophied tonsils. As just stated, however, this rule is by no means constant, since children are found who have enlarged faucial tonsils and no adenoids, and adenoids without enlarged faucial tonsils; yet in the main the two are associated. The examination for the presence or absence of adenoids should always be made at the time the tonsils are examined.

The various diseases of childhood, especially the exanthemata, and repeated colds, seem to be causative; in fact, anything which tends to increase glandular activity seems to favor the enlargement of the tonsils. Strumous, ill-nourished, scrofulous children are quite likely to have both enlarged tonsils and adenoids.

On inspection the diagnosis is usually sufficiently easy. Hypertrophy of the tonsils is likely to be confounded with malignant disease only; the latter is generally one-sided and accompanied by pain and invasion of the adjacent tissue, so that any error of this kind is unusual.

Symptoms. Some or all of the following are usually present: difficulty in swallowing; thickened speech; a tendency to mouth-breathing; constant clearing of the throat, and the frequent occurrence of sore throat. On examination the tonsils seem to project beyond the pillars, into the middle line, frequently almost meeting; and in many cases in which they do not touch, if gagging occurs they will be thrown near the middle line and hit each other. They are irregular in outline, one usually larger than the other. The lacunæ are visible, and a probe can be passed some distance into them. The palato glossus muscle is frequently considerably stretched, so that a large portion of the hypertrophied tonsil may lie behind it, and the tonsil itself be much larger than appears on inspection. These tonsils seem to undergo various changes, at times appearing much larger than at others.

Treatment.—What shall be done for these cases of hypertrophied tonsils? Shall they be removed? or is the tonsil of so much value to the economy that it ought to be left? In answer to the last question I am inclined to think that, so far at least as children are concerned, the removal of the tonsil is not of any loss to the economy. It has been stated on competent authority that there have been many instances in adults in which the singing voice has been altered to its detriment by the removal of hypertrophied tonsils. I have personally had no such experience, nor nor do I recall at the present time a case in which I have ever removed the tonsils and afterwards regretted so doing. With regard to children, the question will be asked, whether as they grow older the tonsils will not grow smaller, and the necessity for operation be avoided; and this question is one not always easy to answer. So far as my personal observation goes, I am inclined to think that in many children tonsils which are very large in early life, say from four to eight or nine years of age, but are producing no particular symptoms, will, if let alone, shrink considerably, and perhaps by the age of puberty be no larger than normal. It has certainly seemed to me that in many cases the tonsils of those children who have not been operated upon have grown smaller, even without treatment.

So far, then, as the question of operation is concerned, both for children and adults, I should take the middle ground, and say that those tonsils which are manifestly causing symptoms, either of difficult breathing, mouth-breathing, frequent inflammation, or are in any way interfering with the comfort and health of the individual, should be removed. And since adenoid hypertrophy and tonsillar hypertrophy so often coexist, it is my own custom in all cases in which the adenoid operation is done, to remove the tonsils at the same time if they appear in the least degree hypertrophied; and thus far I have never regretted so doing.

There are many adults who suffer from chronic lacunar tonsillitis, whose tonsils on being examined do not appear to be enlarged and frequently are not visible at all. On drawing forward the anterior pillar they will be found lying deeply in the sulcus between the two pillars, with their crypts filled with cheesy deposit—a source of foul breath and frequent annoyance. This is the so-called submerged tonsil, and demands removal more than many much larger tonsils which are not producing any symptoms of trouble.

Many persons will be found who fear any operation, or who for various reasons wish some less radical method of treatment. What can be done for them in the way of shrinking the tonsil without removal? With the Leland tonsil knife or the tonsil knives and hooks of Kyle and Makuen the various crypts can be opened, their contents removed with a small curette, the loose tabs of tissue cut off with the Myles' tonsil punch or with scissors, and the bottoms of the crypts cauterized with chromic acid, nitrate of silver, or the galvano-cautery. As a rule, treatment of this kind will reduce the tonsil very much, and may be all that the patient will allow to be done. In children, the syrup of the iodide of iron internally, astringent gargles, and the local application of trichloracetic acid to the surface of the tonsil and as far as possible into the crypts, seem to have some value in making the gland smaller. In case it is impossible to obtain permission to remove the gland, measures of this sort will have to be adopted.

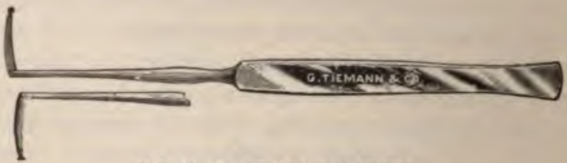

FIG. 65. Leland's tonsil knives.

In connection with removal the question will often be asked if the individual will ever have further trouble with the tonsil. Unless the gland is absolutely dissected out, which is seldom done, there is the possibility of inflammatory attacks, and I always state to my patients, that although the likelihood of an attack of tonsillitis is very small, yet they occasionally occur even after removal of the gland; since it sometimes happens that the portion remaining behind contains some crypts, and inflammation may be again set up in these. Another question which will be asked is, "Will they grow again?" to which question I answer, that as a rule they will not; although it has seemed to me that some tonsils which have been removed, or partially removed, have subsequently increased very much in size.

TECHNIQUE OF OPERATION OF TONSILLOTOMY.

Anesthesia.—Local or General?—Decision as to this question will depend upon the age of the patient and upon whether adenoids are to be removed at the same time. If the latter is the case, and the patient is a child, and in all nervous irritable children over three years of age, I prefer general anesthesia. In children who are tractable, if the tonsils lie pretty free, so that but little dissection away from the pillars is necessary, cocaine anesthesia will answer. In adults I have used one-quarter of a grain of nirvanin, dissolved in twenty minims of water and also the Schleich tablet dissolved in twenty minims of water.

The formula of the latter is as follows:

Cocaine hydrochlor.,	gr. 1-5
Morphine sulph.,	gr. 1-40
Sodium chloride,	gr. 1-5

Ten minims should be injected into the substance of each tonsil. Either of these produces very good anesthesia.

I have many times dissolved the Schleich tablet in 1 6,000 adrenalin chloride solution. This blanches the tonsil and lessens the hemorrhage at the time of operation. In one instance secondary hemorrhage of troublesome character followed two or three hours later, so that the possibility of this is to be borne in mind in case adrenalin is used.

The instruments necessary depend somewhat upon the choice of the operator. The hot and cold wire snares have their advocates on account of the lessened danger of hemorrhage in their use.

If the tonsil is separated from the adhesions to the pillar and drawn out with a retractor before tightening the wire, no method of rapid tonsillotomy is more effective than the cold wire snare. It is, however, more painful than the tonsillotome. I have found the Sloane to be the most satisfactory form of tonsil snare. The galvano-cautery dissection of the entire tonsil, after the manner of Pynchon, is probably the most effective way of removing the entire tonsil. It requires several sittings, is more or less painful, and is a method not generally applicable for use by the average practitioner.

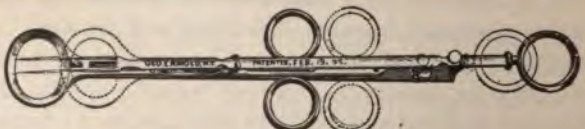

FIG. 66. Modified tonsillotome.

Under most circumstances, a sufficient amount of the tonsil can be removed by the method now to be described. For the physician operating but seldom, a medium-sized Mathieu or Mackenzie tonsillotome will answer most purposes. These come in three sizes, and it is advantageous to have all three, though for most cases the medium-sized instrument will answer. It is better to have the instrument rather small than too large. If the edge of the cutting instrument is not too sharp, the resulting hemorrhage seems to be lessened. Certain auxiliary instruments are needed, viz., a pair of Emmet's right and left uterine scissors or a Myles' tonsil punch for cutting any loose bits of tissue which may remain; two pairs of long-handled hemostatic forceps; a right-angled knife, for separating the adhesions between the tonsil and the pillars; some cotton applicators; a good tongue depressor; and, for children, a mouth-gag. If the tonsils are rather flat, the Mackenzie tonsillotome, the blade of which cuts from the operator, will do better work than the Mathieu, in which the blade cuts towards the operator. An assistant, either a physician or a good nurse, is necessary.

Place the needed instruments on a stand where they can be reached in a moment. Have ready absorbent cotton, peroxide of hydrogen, and some hot water. Very small children should be held; others may sit in a straight-backed chair. Use artificial light and a forehead mirror, or else a good north light so arranged as to shine full into the patient's mouth. In cases in which general anesthesia is not used anesthetize the fauces and tonsils with three or four applications of a four per cent. solution of cocaine, or use the hypodermic injection just referred to. While the anesthesia of the local application is of the surface principally, it very materially mitigates the pain of the operation. As soon as anesthesia is attained, examine carefully to see whether there are any adhesions of the tonsil to the pillars, and if so, carefully separate these either with an instrument or with the finger. In general anesthesia the finger-tip can be used to separate the tonsil from the pillars. The bleeding from this is trifling. A little more cocaine is now applied. With children one may or may not use the mouth-gag, according to the tractability of the patient. With the adult I have not found the mouth-gag necessary. The tongue is now firmly depressed, while the assistant holds the head and presses with the fingers on the side of the neck corresponding to the tonsil to be removed.

The tonsillotome is next introduced, the lower side of the ring of the instrument being carried as low down in the throat as possible, so as to embrace the under or lower side of the tonsil first. It is then lifted up, the upper side of the ring pressed over the top of the tonsil, and the whole tonsillotome pressed firmly upwards and outwards. The tonsil being now fully embraced by the instrument, the spear is driven into it, the knife drawn forward, and the tonsil cut off. An error often made is in cutting off the top of the tonsil, while the lower portion, which if anything is the most troublesome, remains behind; hence one should be certain that the tonsil is grasped in its entirety before its excision. The patient is now allowed to spit out the blood, and if there is no bleeding of any account the instrument is introduced on the opposite side, and the second tonsil removed. Examination is now made in regard to bleeding. This will at first be very profuse, but in from three to five minutes it should mostly have subsided. If it has subsided, examination is again made to notice whether any remnants or rough portions have been left behind, and if any are found, they are clipped off with the scissors or Myles' tonsil punch, so as to leave a smooth, well-retracted surface.

If the bleeding does not promptly subside, bright blood continuing to be spit out steadily, and the operator begins to feel uneasy, and the patient perhaps gets a little frightened, what is to be done? While fatal cases of hemorrhage are almost unknown, troublesome hemorrhage is more or less frequent in the experience of almost everyone who operates at all often. A host of hemostatics are mentioned in the text-books, such as tannin, alum, Monsell's solution, peroxide of hydrogen, hot water and ice. They are all unsatisfactory, except the last three. Carefully inspect the cut surface of the tonsil for the site of the hemorrhage, which usually comes from one or more small branches of the tonsillar artery, there being practically no danger of cutting either carotid, as both lie too far to the side to be reached by the instrument. If there is simply a persistent oozing, soak a pledget of cotton in pure peroxide and apply under pressure directly to the cut surface of the tonsil. In the great majority of cases the bleeding will promptly stop under this application, which is a cleanly, efficient, antiseptic hemostatic. But this is not always the case. Suppose there is a bleeding point which is spurting? Wipe the surface carefully and quickly with a bit of cotton, and apply a long hemostat directly to the bleeding surface, clamping the bleeding vessel. If properly applied this is effective, and the patient whose mouth may be somewhat sore from manipulation, can close it over the hemostat, the latter being allowed to remain in position several minutes. On removing the hemostat twist it off, thus effectually closing the vessel by torsion. In using the hemostat care must be taken not to catch any portion of the anterior pillar. I unfortunately twisted the edge of this somewhat in one case, and a partial paralysis of the soft palate followed, which was exceedingly annoying for some ten days, causing regurgitation of fluids and a disagreeable voice. Provided with hemostats, I now do tonsillotomy with comparatively little dread of hemorrhage, as I am prepared for it if it comes. Should no hemostat be at hand, pressure with a piece of cotton under the thumb, with the corresponding fingers on the vessels of the neck, will usually suffice to stop the bleeding.

Keep the patient under observation at the place where the operation is done for at least two hours, examining the throat carefully before leaving him. It very frequently happens that the bleeding ceases only to start up again, the clot being dislodged by the patient's efforts at retching. This is more likely to occur with adults than with children. The following examples will illustrate this: A young woman of twenty-eight, with comparatively small tonsils, but which were troublesome and very adherent to the pillars, was operated upon for their removal. The adhesions were separated, and the tonsils removed with the Mathieu instrument. There was no bleeding of any account for an hour, at the end of which time I left her for about fifteen minutes, expecting to find on my return that the hemorrhage had entirely stopped and that she was ready to go home. To my surprise I found her spitting bright blood and feeling weak. On examination I was at first unable to determine from which tonsil the blood came. I applied a wad of cotton with the pressure of the finger on both sides alternately, and then carefully examined the throat. I was rewarded by finding two small spurting vessels close together, throwing their blood stream directly on the opposite tonsil, which accounted for the fact that there was fresh blood on each. A hemostat was promptly applied, left in place a short time and then twisted off. The bleeding stopped instantly, and in another hour she was allowed to go home; no further bleeding followed. The next case was that of a plethoric adult, in whom the clot formed promptly and the bleeding stopped; but after five to ten minutes the clot seemed to be pushed away by the blood pressure and then oozing continued. In this instance I seared the surface with the galvano-cautery, applied a pledget of cotton soaked in peroxide, and at the end of an hour the patient was allowed to walk home. The bleeding started up once more some four or five hours afterwards, but only for a few moments, and there was no further trouble. In another patient, a young woman of thirty, the hemorrhage at the time of operation was comparatively slight, but oozing persisted for some two hours in spite of pressure and the use of the galvano-cautery, although the absolute amount of blood lost was comparatively little. She then fainted away, and no further bleeding followed. These examples show that there is some danger of troublesome hemorrhage, especially in adults. Patients should therefore be kept under observation for some time, and instruction given to some attendant to apply pressure in case the bleeding should start up, while the physician should be in readiness to attend. I have had almost no trouble with young children. In one child there was a little starting up of hemorrhage some three-quarters of an hour after removal, but pressure with the cotton pledget soaked in peroxide sufficed to stop it.

But little after-treatment is needed. For home use I advise a gargle of peroxide of hydrogen and water, about twenty-five per cent. solution, to be used occasionally, not frequently, as frequent gargling tends toward dislodgement of the already formed clot. There will be some soreness, for which daily spraying with an antiseptic alkaline solution is all that is necessary The patient's own feelings are a fair indication as to diet; in general, liquids are given for a few days. A white deposit will form over the cut surface; this is not to to be confused with diphtheria, being merely an attempt on the part of nature to protect the cut surface while healing is going on, and it will come away of itself in a few days.

Before doing any operation careful inquiry should be made as to the presence of the hemorrhagic diathesis, and when this is present in the slightest degree no operation should be performed.

In adults with hard, firm tonsils it may be inadvisable to operate on account of the fear of hemorrhage, although, considering the number of tonsillotomies that are performed, the danger from hemorrhage must be considered as comparatively slight; and if the patient is accessible to the physician for a day or two following the operation, it is my opinion that hypertrophied tonsils can, in nearly every instance, in adult or child, be safely removed. In any case, however, in which the operator is fearful, considerable can be done for the comfort of the individual by the method of opening up the crypts and cutting away the loose tabs of tissue, as no hemorrhage of any account will follow this procedure.

CHAPTER XVII.

THE LINGUAL TONSIL.

At the base of the tongue, between it and the epiglottis, and on each side of the glosso-epiglottic ligament, there are a number of little elevations, somewhat analogous in structure to the faucial and naso-pharyngeal tonsils, known collectively as the lingual tonsil. In many individuals this growth is so small as to be almost unnoticed, while in others it enlarges considerably and becomes a source of annoyance to the individual. Unlike the other tonsillar tissue, it is comparatively rarely that it is noticeable in childhood or gives rise to any trouble; and it is only in adults that it demands our attention by reason of the symptoms which it produces.

The lingual tonsil is of annoyance to the individual when it becomes hypertrophied to such an extent as to act as an irritant. This usually occurs in adult life, the enlargement seldom if ever beginning until sometime after the age of puberty. Unlike the other tonsillar tissue, the tendency here is towards enlargement at puberty rather than diminution.

The symptoms to which it gives rise are a sense of foreign body in the throat—something which the individual is constantly trying to get rid of by means of hemming, hawking and scraping—and an irritable, useless, tickling cough, unaccompanied by secretion. When a patient presents himself with these symptoms, examination should be made with the laryngeal mirror or by direct inspection of the area at the base of the tongue. If the lingual tonsil is hypertrophied, a number of irregular elevations, little velvety bodies, will be seen, against which the epiglottis presses. On touching them with a curved applicator or probe the patient will often state that the source of difficulty has been touched. These elevations are sometimes from a quarter to half an inch in height.

Treatment will depend upon the size of the follicles If extremely large, removal with a lingual tonsillotome is the most efficient method of treatment. The lingual tonsillotome of Myles is the best instrument for this purpose. In using this instrument either direct vision, the tongue being strongly depressed, or the laryngeal mirror can be employed. Push the fork well into the hypertrophied lingual tonsil, and then cut off with the knife. Where the tonsil is smaller, the galvano-cautery used at intervals of about a week is quite efficient. For the cases in which the hypertrophy is only moderate I have found the use of chromic acid, after cocainization, at intervals of about five days, to shrink the growth very satisfactorily and to give great relief. In most instances I find the latter procedure sufficient. It is followed after each application by spraying with nitrate of silver, and I sometimes apply a little pure nitrate of silver fused on a probe, or strong solutions of silver, directly to the hypertrophied follicles. There is some tendency to recurrence. The condition has seemed to me to be in a measure associated with, and

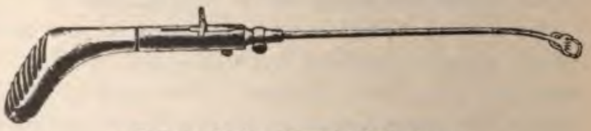

Fig. 67. Myles' lingual tonsillotome.

perhaps dependent upon somewhat the same conditions as granular pharyngitis.

Many a case of annoying cough not reached by ordinary methods will be found dependent upon hypertrophy of this tonsil. It does not seem liable to the same inflammatory affections as the other tonsils, is seldom affected by diphtheria, and appears to be of annoyance to the body chiefly by reason of its mechancal interference. Improper use of the voice has been stated to be the principal cause; I have not been able to verify this observation. So far as the sexes are concerned, it occurs in the proportion of about three in women to one in men.

CHAPTER XVIII.

NASAL NEUROSES.

Neuroses of the nose consist of disorders of the olfactory nerves known as neuroses of olfaction, and of that class of affections known as reflex neuroses. The latter cover a number of morbid phenomena which may either arise in the nose and have their effect in some other part of the body, or arise in some other part of the body and have their principal effect in the nose.

NEUROSES OF OLFACTION.

The olfactory nerve comes from the olfactory bulb through the cribriform plate, and is distributed over the surface of the superior turbinate, the upper half of the middle turbinate and the corresponding area of the septum. To have the function of olfaction properly performed there should be free access of air to this area; hence anything interfering with this may cause disorders of the sense of smell.

PAROSMIA is a perversion of the sense of smell; while the sense of smell may or may not be perfect for ordinary odors, there are in addition certain imaginary odors. This is comparatively common among the insane, and is found in epilepsy, hysteria, and syphilis. It occurs in connection with the epidemic disease of grip, and cases have been reported of patients who were annoyed for days by unpleasant odors and taste. I have observed this condition in connection with atrophic rhinitis when the ordinary sense of smell was destroyed. The affection is comparatively rare.

HYPEROSMIA is an exaggeration or hyperesthesia of olfaction. Odors not ordinarily noticeable produce impressions, while odors which the healthy nose would not notice may cause great annoyance, the odor often being retained several hours after the removal of an offending substance. Like parosmia it is comparatively rare. There seems to be some connection between it and certain disorders of the sympathetic nervous system.

The treatment of both parosmia and hyperosmia should be directed to the cause so far as it is possible to ascertain it. In the main, both of these affections are dependent more upon some general nervous disorder or some neurotic predisposition than upon disease in the nose itself.

ANOSMIA or loss of smell is by far the most common of the disorders of the olfactory nerve, and occurs very frequently. It may be congenital or acquired, but the congenital form is very rare. It is acute or chronic, acute loss of smell being very common in connection with any disease which causes swelling of the area of distribution of the olfactory nerve. Associated with the loss of the sense of smell there is usually diminution in the sense of taste. When accompanying severe rhinitis or grip this loss of smell may be so very annoying that the person afflicted is entirely unable to recognize common foods, especially liquids. As a rule no treatment is required directly for the affection when acute, as with the subsidence of the inflammatory process in the nose the smell and taste gradually return.

When loss of smell has come on slowly, and is the result of chronic inflammatory processes, of new-growths in the nose, or of atrophic processes, such as atrophic rhinitis, the chances of its cure are very much less than when it is of acute origin. It has been my experience that cases of anosmia have responded very poorly to treatment, and the correction of the apparent cause in the nose has not always been followed by as gratifying results as could be desired; hence the prognosis must be considered comparatively poor when the loss of smell has lasted for any length of time, although cases are reported in which the sense of smell has completely returned after the removal of pathological conditions which had prevented the access of air to the olfactory filaments. I have had several such cases, but in the main the results of treatment of anosmia of long standing have not been satisfactory.

The symptomatology and diagnosis offer no particular difficulty.

The treatment consists of measures to improve the general nervous system and to get the nose and throat into the best possible condition. The local treatment will depend upon the conditions found on examination of the nose. Anything which interferes with the free access of air to the olfactory area must be corrected. Local stimulation will often be needed. An attempt should be made in all cases to improve both local and general conditions, while at the same time a somewhat guarded prognosis should be given.

Reflex Nasal Neuroses.

From the time of the earliest medical writers up to the present it has been known and recognized that certain morbid conditions of a particular organ may cause effects which will be referred to an organ in some other part of the body; and these effects or impressions can be either sensory, sensitive, motor or vasomotor. Many of these have their origin or point of explosion in the nose; and this class of cases is known collectively as the reflex neuroses of the nose. Among them are hay fever, certain forms of asthma, sneezing, many headaches, various coughs, some affections of the eye, and a variety of diseases of the central nervous system; and, conversely certain disorders of the digestive and sexual organs produce reflex nasal symptoms. To bring about a reflex three factors are necessary—a sensory or sensitive nerve fiber, a ganglion with which it is in connection, and a terminal motor or vasomotor nerve fiber in connection with the ganglion. The nose is supplied with a sensory nerve apparatus in the shape of the olfactory nerve, and with sensitive nerve fibres from the trigeminus. All of these are in relationship with many ganglia, and these ganglia connect with the sympathetic system, while the trigeminus itself, coming from the floor of the fourth ventricle, is in intimate relationship with the point of origin of the pneumogastric and spinal accessory nerves. Hence it is comparatively easy to understand that reflex disturbances of various kinds can have either their points of origin or their points of destination in the nose.

These reflex neuroses of the nose may be divided etiologically into three classes:

First, those in which the sensitive irritation originates in the nose, while the resultant reflex appears in an organ outside of the nose. In this class are asthma of nasal origin, coughs, epilepsy, disorders of the eye and of the general nervous system.

Second, those neuroses in which the sensitive irritation is in the nose, while the reflex asserts itself also within the nasal cavity. In this class are the various forms of nervous catarrh, vasomotor rhinitis or hay fever, and hydrorrhea.

Third, those that have their sensitive irritation in some other organ and are referred reflexly to the nose, producing nervous colds, sniffing, hyperemia, swelling of the mucous membrane of the nose, erythema, edema and other anomalies of the skin of the external nose. Under this head are those dependent upon indigestion, and disorders of the sexual apparatus.

ASTHMA.

The pathology of asthma is still far from being satisfactorily worked out. It seems to partake of the characteristics of both a local disorder and a constitutional affection, and is sometimes assigned to one and sometimes to the other of these classes. From the fact that many cases of asthma are accompanied by intra nasal lesions and are improved by the cure of the intra-nasal condition, the intra-nasal origin of asthma has been asserted. Its principal advocate is Bosworth, who considers it a vasomotor bronchitis, with a local, more or less periodic explosion, and the phenomena of hay fever as a vasomotor rhinitis. The two affections have much in common and not infrequently affect the same individual.

While it is not at all probable that every case of asthma is dependent upon disorders of the nose, it is nevertheless true that many cases of asthma are, if not caused by, at least made much worse by such intra-nasal disorders as polypi, hypertrophies of the turbinates, and the presence of deviations and septal spurs which hinder the passage of air; and it is also true that on the correction of the nasal conditions the attacks of asthma become much less severe and not infrequently cease altogether. The practical point therefore is that in all cases of asthma the nose must be carefully examined and any pathologic conditions found therein corrected so far as possible. Attention to this, while it will not cure every case of asthma, will in many cases bring about marked improvement and now and then a cure. Such general treatment as the individual case seems to demand is, of course, to be carried out at the same time.

REFLEX COUGH.

Many cases of persistent cough, without expectoration, entirely unrelieved by ordinary methods of treatment, will be found to be due to intra-nasal conditions, the treatment of which will cure the cough. I have had many such cases in my personal experience, and the literature abounds with them. One case in particular had a diagnosis of probable phthisis made by a competent physician, but no relief following measures of treatment, the patient was examined as to nasal conditions, when marked hypertrophy of the turbinates was found to be present, with extremely difficult breathing at night. Several cauterizations of the turbinates with chromic acid completely relieved the condition, and several years have elapsed without any return of the cough. A case occurred in the practice of a friend of the writer, in which a young woman, twenty-three years of age, had been since the age of twelve under the care of various physicians for a peculiar barking cough, something like the yelp of a hound, during which time the cervix uteri was dilated and both ovaries were removed. She was also operated upon for vesical calculi and then for hemorrhoids, all of these operations being done for the cough and other nervous conditions. Finally, none of these procedures giving any relief, and having been subject to headaches and sore nose since childhood, the nose and throat were examined. Both inferior turbinates were found to be markedly hypertrophic, and the pharynx granular. The cough growing worse instead of better, some ten per cent. cocaine solution was prescribed for an acute attack of rhinitis. This not only relieved the nasal condition but stopped the cough. The cocaine was followed by chromic acid crystals applied to each inferior turbinate, when there was immediate cessation of the cough and relief of the neurotic symptoms. Several applications were made, and at last reports the patient remained entirely relieved and the general health better than at any previous time since childhood. Large numbers of such cases could be cited; hence the possibility of the nasal origin of an intractable cough is to be borne in mind, and the nose examined whenever there is the least likelihood of that kind of cough being present. In fact, the physician who forms the habit of examining the nose whenever any symptom is present for which there is the slightest possibility of its cause being in that organ, will frequently find information of importance.

Epilepsy, diseases of the eye and the general nervous system dependent upon reflex nasal trouble, while they occur, are not very common

HAY FEVER.

Under this head are included the various forms of nervous catarrh, vasomotor rhinitis and pollen colds, the names of which latter are legion, but in description of which the general term "hay fever" has acquired usage. It is a poor term, but is commonly used, and is applied to that group of nasal phenomena seen most frequently during the season of hay blossoming and curing, but also present at other times of the year, and accompanied by the symptoms of a general vasomotor rhinitis. It is most prevalent at the time of flowering of certain plants, the pollen of which seems to be the exciting cause by reason of its irritation of the sensitive nerve fibers supplying the nose. This is accompanied by more or less paralysis of the nerves which control the exosmotic function of the nose, and there results the pouring out of a large amount of fluid—a sort of hydrorrhea. This process is not an inflammatory one, and has marked differences from those symptoms observed in an ordinary coryza. It seems to be more common among men than among women, and in those of a highly organized nervous temperament.

The symptoms are those of an intense coryza, coming on suddenly, with almost no tendency to spontaneous recovery, occurring generally between May and September, and most frequently of all, according to the statistics of Beard, between the tenth and the thirty-first of August. It is accompanied by sneezing, itching, running of the eyes and congested conjunctivæ, frontal headache and swollen turbinates, so that nasal respiration is impossible. All symptoms are worse at night, and inability to sleep is usual. Loss of smell and consequent loss of taste, cough and prostration are common features. There may be slight fever, although this is probably more often absent than present. Occurring in June it is called "June or rose cold." The attacks come on with considerable periodicity, occurring about the same time, it is even asserted at the same date, from year to year, though usually ceasing with the first frost or with the advance of the season sufficiently far that the irritating pollens are no longer present in the air.

Its etiology seems to depend upon three factors: First, hyper-excitability of the nervous constitution; second, more or less edematous or hyperplastic condition of the nasal mucous membrane, so that its swelling is favored, spurs or deviations mechanically favoring hindrance to respiration and intensifying the symptoms being frequently present; third, some irritating atmospheric condition. It has generally been regarded that the local conditions were the cause of the neuroses, although Wright has stated that he regards the local conditions as not infrequently the result rather than the cause of the neuroses.

The diagnosis is not usually difficult; the history of recurring attacks at the same season of the year, and an examination of the nose in connection with the general appearance of the patient being usually sufficient. While the turbinates are very much swollen and are bathed with thin watery mucus, the condition is not usually one of distinct inflammation, but rather of bogginess. The mucous membrane retracts readily under the probe, but soon returns to its former position. Under the use of cocaine the nostrils are shrunk to such a degree as to admit the passage of air. When cocaine was first introduced it was used as one of the remedies in the treatment of hay fever, and it is frequently resorted to at the present time for the purpose of gaining temporary relief. The relief which it gives is purely temporary, however, and on account of the danger of the cocaine habit it is not desirable for the patient to use it. The new agent, extract of suprarenal gland, or its alkaloid adrenalin chloride, is now being supplied as a remedy for hay fever. There is no doubt that it shrinks the nasal mucous membrane to a greater degree than does cocaine, but it seems to me that it has the same objections when used in any quantity as cocaine, as there is a subsequent reaction with as great swelling as before its use, although there may not be the same danger of the formation of a habit. When strong solutions are employed the immediate relief is very great, but after a certain length of time there is a corresponding reaction, and the individual is liable to suffer more acutely than before.

I am in the habit of treating cases of hay fever somewhat as follows: If possible they are seen in advance of the attack, and all the nasal conditions rendered as perfect as possible. In cases of narrow nostrils with attacks occurring at varying times of the year, I have found that the removal of the middle turbinate on one or both sides has contributed greatly to the relief of the patient. At the time of the attack I shrink the nose thoroughly with cocaine and suprarenal, and apply once or twice a week chromic acid to the inferior turbinate and, if necessary, to the anterior end of the middle turbinate. At the time of the attack I prefer chromic acid to the galvano-cautery. The patient is then given for home use a tablet containing:

Quinine sulph.	1-2 gr.
Ammon. chloride	1-2 gr.
Camphor	1-2 gr.
Opium powder	1-10 gr.
Ext aconite	1-10 gr.
Ext. belladonna	1-10 gr.

This is given every one, two or four hours, according to the severity of the paroxysm. To relieve the stuffed-up feeling I have ordered a spray of one dram of adrenalin chloride, 1 1,000 solution, in two ounces of some one of the alkaline nasal preparations or in normal salt solution. This is employed by the patient whenever the nose seems to be filling up again, and only then, and so far I have had no reaction from its use. Such a weak solution of adrenalin being used it is doubtful if it can do any harm by its reactionary effect; and it serves to maintain the patency of the nose already attained by the cauterization. An increased amount of atropia or belladonna can be given when the attack is especially severe. It has seemed to me that of all the drugs used internally for this form of coryza, belladonna or its alkaloid is the most valuable. Mackenzie uses the following prescription:

Zinci phosphid.	1-16 gr.
Quinin. sulph.	ij. gr.
Ext. nucis vom.	1-4 gr.

before meals

and Donovan's solution, gtt. iij-v, after meals. Change of climate has been found beneficial by many sufferers, and the White Mountains are especially recommended for this affection. For the individual who is unable to go away from home, the method of treatment here outlined has produced good results. In addition, many authors have recommended the use by the patient of some one of the oily sprays containing camphor, menthol, oil of eucalyptus, and other antiseptics. I have not found them to be of so very much value, although it may be that the pollen is less irritating when the mucous membrane can be kept more or less covered by this oily spray.

Recurrences take place as a rule, but patients who have had severe attacks before the nose has been put into good condition invariably suffer less afterwards, while the asthma, which is frequently an accompaniment of hay fever, has in my experience been much less marked or has disappeared altogether after the proper treatment of the nose.

Curtis has recently proposed to procure a tolerance to the irritant effect of the pollens by administering internally a fluid extract of them; and as ragweed—ambrosia artemisiæfolia—is more often accounted the cause than any other plant, he began his experiments by preparing a fluid extract of the ambrosia, to be given in teaspoonful doses before the attack was expected, increasing the dose to the limit of toleration by the stomach. As a result of his three years' experiments, he concludes that those cases of hay fever which are dependent upon ragweed as an exciting cause were immunized in about sixty per cent. of the cases treated, while in the other forty per cent. the remedy did not seem to do any good.

The third class of reflex neuroses occur comparatively seldom, the most frequent being nasal hyperemia as the result of digestive disturbances. Here there may be some doubt whether it is a true reflex or a passive congestion. The occurrence of nasal disease as a result of irritation or excitement of the sexual apparatus has long been known. The reflex is probably brought about through the sympathetic system, and is favored by the close similarity of the erectile tissues of the nose and those of the generative organs. An attempt has been made to demonstrate nervi erigentes in the nose, but thus far without result. Vicarious menstruation by way of the nose and other disturbances dependent upon menstrual irregularities have also been observed. The reader desiring to study these reflexes further is referred to the researches of J. N. Mackenzie, Grayson, Fliess, and others. The subject has been studied in most minute detail by Dr. Mackenzie.

Spasmodic or paroxysmal sneezing is occasionally met with in cases in which no nasal trouble can be found to account for it, and when the person affected is apparently in perfect health. It has occurred during pregnancy, when it was undoubtedly a manifest reflex of the class just considered.

Various other affections of a reflex character, such as glycosuria, salivation, esophageal spasm, hiccough, spasmodic croup. aphonia, chorea, neurasthenia, acne, melancholia, and others, have been charged to the nose; and while it is proper to examine the nose in all of these diseases, it must not be forgotten that nasal disease can exist coincidently with many other affections without necessarily being the cause thereof.

CHAPTER XIX.

NEUROSES OF THE PHARYNX.

ANESTHESIA of the pharynx may be of either central or peripheral origin. It is seen in connection with epilepsy, in hysteria, and after some of the severe general diseases, especially diphtheria. Certain drugs as cocaine, eucaine, morphine, chloral, bromide of potassium, carbolic acid and menthol, when used locally or internally, may also bring it about.

The *diagnosis* offers no difficulties. When the condition is the result of diphtheria, it is often accompanied with paralysis of the muscles of the larynx and pharynx.

Both the *prognosis* and *treatment* depend entirely upon the cause. When associated with diphtheria, the treatment is that of the general paralysis of diphtheria, consisting of measures to keep up the nutrition of the parts, and careful feeding to prevent the introduction of food into the larynx.

HYPERESTHESIA of the pharynx is very common, and is often extreme, especially when any attempt at an examination is made, the opening of the mouth and the drawing out of the tongue frequently eliciting strong reflexes. It is common in persons apparently perfectly sound, but is more marked in the very fat, in drinkers, smokers and nervous persons. Local diseases intensify all the manifestations.

While hyperesthesia of the pharynx is difficult to cure by any method of treatment, most persons will, after a while, become used to manipulations, and the treatment of any pathological condition present usually diminishes the sensibility. The local use of cocaine, menthol, the various astringent gargles, and the bromides internally, with the avoidance of alcohol and tobacco, is the principal method of treatment.

PARESTHESIA is the name given to a variety of abnormal sensations which occasionally occur in the pharynx, especially in the hysterical and nervous. Among the sensations described are burning, pressure, itching, dryness, lumps, or the sensation of a foreign body. One of the common forms of paresthesia is the belief that there is a cancer in the throat, the circumvallate papillæ or the tip of the epiglottis being felt by the finger; and it is often extremely difficult to rid the mind of the patient of the idea that a new-growth is present.

The *diagnosis* can only be made after a careful examination of the entire pharynx and adjacent region, so as to be sure that no possible source of irritation is overlooked. Sensitive spots can be determined by the aid of the probe.

The *treatment* must depend entirely upon the cause, being in the main of a constitutional character.

SECRETORY NEUROSES. Hypersecretion is found in singers and other individuals who, although having apparently completely normal mucous membranes, yet complain of an increased secretion of slimy mucus in the pharynx and nasopharynx, which requires them to swallow often and to spit a good deal when talking. Examination will show more or less mucus on the back of the pharyngeal wall and around the velum palati. The condition is sometimes observed in old people, and its cause seems to be some disturbance in the nervous control of the secretory glands.

Treatment is only partially successful. Belladonna has been recommended; small doses of iodide of potassium or the syrup of hydriodic acid sometimes do good by stimulating somewhat the secretion of the glands and rendering this secretion less thick, so that the condition is less troublesome.

In hysteria and after the use of morphine or belladonna, and in sufferers from diabetes, complaint is made of a feeling of great dryness in the throat.

NEURALGIA of the pharynx, or pain in the throat, for which no assignable cause can be found, sometimes occurs. In most instances it is probably of rheumatic or gouty origin, and treatment directed along these lines brings the most relief. It is most common in cold weather, when some acute cold or febrile disturbance may be the exciting cause.

NEUROSES OF MOBILITY are infrequent but do occur, and are most commonly seen in hysterical dysphagia, in which affection the swallowed mass is sometimes temporarily arrested at some point. Cramp-like constriction of the muscles, also interfering with swallowing, is found in connection with diseases of the brain, and may be an accompaniment of tabes. It is sometimes difficult to differentiate hysterical dysphagia from true paralysis of the pharyngeal muscles.

Prognosis and *treatment* depend entirely upon the actual condition present.

TRUE PARALYSES of the pharynx are mostly of central origin, but occur also in connection with lead intoxication, phthisis, the grippe, and from the pressure of carcinomatous glands upon the vagus and its branches. Diphtheria and scarlet fever are the most frequent of the peripheral causes. Paralysis of sensation and of motion may occur together. The soft palate is the muscle most often affected, and here the paralysis may be one sided or double-sided, complete or incomplete. When one-sided the palate may be drawn toward the sound or toward the diseased side. If the uvula alone is paralyzed, it goes toward the sound side. In double paralysis the velum hangs with the uvula straight down and shows no sign of active movement except in respiration, when the uvula moves slightly back and forth. The voice has a very nasal tone. There is seldom difficulty in swallowing, unless the constrictors are also affected, in which case the particles of food may be thrown into the nose, which may also occur if the superior constrictor is alone paralyzed.

Paralysis of the constrictors, with or without accompanying paralysis of the velum and of the esophagus, is seen most frequently in connection with diphtheria, scarlet fever and the other infectious diseases, and in bulbar paralysis. When the paralysis is limited to the constrictors, particles of food lodge at the base of the tongue and in the adjacent sinuses, and fluids pass easily into the larynx, producing cough and suffocation.

The *diagnosis* is not difficult, but the condition is often overlooked, especially if the paralysis is incomplete.

In paralysis of central origin the electromotor excitability is normal and may remain so. In bulbar paralysis it rapidly diminishes and can be lost by the third week. When of hysterical origin the paralysis appears suddenly, disappears as suddenly, and reappears without apparent cause.

The *prognosis* is good when the condition is of diphtheritic, rheumatic, infectious or of local inflammatory origin, but poor when it is of central origin.

Electricity is the best remedy. The galvanic current is preferable, though the faradic can be used to advantage. If the paralysis has lasted any length of time both are indicated, as the faradic helps to maintain the nutrition of the muscle, while the galvanic directly stimulates the nerve. In using electricity, one electrode should be placed on the cervical vertebræ or the anterior surface of the neck, and the other on the pharyngeal wall, against the paralyzed muscle. The pharyngeal electrode should be one in which the current can be turned off and on. Strychnine internally and remedies which promote the general nutrition are to be used in addition.

NEUROSES OF THE LARYNX.

ANESTHESIA, HYPERESTHESIA and PARESTHESIA of the larynx are somewhat similar in their causes and symptoms to the same conditions as found in the pharynx, and hardly need further discussion.

NEUROSES OF MOTION occur as spasms of the various muscular groups, as incoordination of the larynx muscles, and as true paralysis of various groups of muscles.

LARYNGEAL SPASM.—The adductor group of muscles is the one affected. The attack consists of a more or less sudden closure of the glottis, interfering seriously with respiration. It may occur during attempts at phonation, sometimes preventing this while not interfering with respiration; at other times interfering with swallowing; again giving the sense of suffocation when no danger is really present It is seen perhaps most frequently in what is known as *laryngismus stridulus* of children, a phenomenon due probably to some irritation of the vagus or recurrent nerves. It is sometimes ascribed to rickets, but the pathology is not yet satisfactorily determined. While occurring frequently in poorly nourished children it is also seen in children otherwise perfectly well, usually between six months and three years of age. As a rule, the attack comes on at night; the child, having gone to bed apparently well, starts up suddenly in sleep, gasping for breath, with a livid countenance, and for a few seconds respiration apparently ceases. Unconsciousness may supervene and death occur, but usually respiration of a gasping character begins again, and after a short time becomes normal. The condition is one that is terribly frightening to the parents. There may be one or more attacks in the same night, or they may appear at irregular intervals. The attack is usually over before a physician can see the child. Cloths wrung out in hot water or ice water and applied to the cervical region have been recommended. Chloroform inhalations, morphia hypodermically, emetics, and a great variety of other remedies have been used. General hygienic treatment gives perhaps the best results, and after a while the attacks cease. The death rate except among sickly children is very small. This condition is also known as spasmodic croup. While rare in adults, laryngeal spasm does occasionally occur, and when very marked may require tracheotomy for its relief.

NERVOUS COUGH.—This is a form of tonic spasm of the glottis, in which there is more or less persistent, somewhat rhythmical bark or cough, due to irritation of some of the fibres of the laryngeal nerves, usually reflex from irritation at some distance, and treatment for which is of no value until the point of irritation is discovered. This cough is always absent during sleep, and is a manifestation of hysteria. It usually disappears after a longer or shorter time, its place being taken by some other phenomenon. It has sometimes been described as laryngeal chorea.

INCOORDINATION OF THE LARYNGEAL MUSCLES occurs in connection with over-fatigue, and results in more or less complete closure of the glottis and inability to produce sound when desired. Public speakers, clergymen and singers complain of it, usually stating that they have suddenly lost the voice. Examination of the larynx shows little change in the cords, and at the time of examination the coordination is usually normal. The resting of the voice, tonic treatment and stimulating sprays are necessary.

There is a condition which can be described as *voice tire,* in which the coordination seems normal, but in which the resulting voice has a hoarse note. This is seen in those who use the voice a good deal. Stimulating sprays and electricity, one pole applied over each pneumogastric nerve, are very serviceable in treatment. The galvanic is the best current for this affection.

TRUE LARYNGEAL PARALYSES.—These may be of central or peripheral origin, but are probably most commonly of central origin, the fibres which form the recurrent nerve being the ones most frequently affected. This nerve supplies all the laryngeal muscles except the crico-thyroid, this being supplied by the superior laryngeal, which is also the nerve of sensation of the larynx. These paralyses are seldom of isolated muscles, but rather of muscle groups. When all the muscles supplied by the recurrent nerve are affected, the vocal cord assumes what is known as the cadaveric position, that is half way between the line of extreme adduction and abduction. Except where there is manifest pressure of some new-growth, the origin is probably central, and this is more likely to be the case when the paralysis is bilateral. When bilateral the voice is entirely lost, and only a hollow, hoarse whispered note is produced. There is no interference with respiration. When only one side is affected and the cord of the opposite side phonates properly, the unaffected cord will pass over beyond the middle line so as to almost meet its fellow, and a usable voice will result. In the case of unilateral paralysis of any kind, search should be made for local causes, such as tumors, aneurisms and the like.

The laryngeal muscles may be divided into three groups,—the abductors, the adductors and the tensors of the cords.

Abductor paralysis is fortunately an unusual condition, and is due to paralysis of the crico-arytenoideus posticus. This paralysis results in a gradually developed true inspiratory dyspnea, with intense distress and a normal or almost normal tone. By the action of the adductor group the cords are brought together in the middle line during inspiration until only the narrowest chink remains. During expiration the cords again separate, and there is no obstacle to the passage of air. As the tensors and adductors are not affected, there is practically no hindrance to phonation. The condition is probably of central origin, comes on comparatively gradually, and if not realized at its full gravity death occurs from suffocation before relief is given.

When the diagnosis is made, the patient should be constantly watched, and as soon as there is any sign that the condition has got so far that there is danger of suffocation tracheotomy should be performed. As this condition is liable to be accompanied with rapid respiration and more or less bronchitis, the first few days after tracheotomy is done are days of anxiety. There is likely to be developed a sharp, acute bronchitis or even a pneumonia, the result of which may be fatal. Recovery, however, may be expected to occur in most instances. The tracheotomy tube will have to be worn for some months and possibly permanently. A few cases of complete recovery from the paralysis have been reported, but this is rare.

Unilateral abductor paralysis when uncomplicated produces no alarming symptoms, and would only be discovered on laryngoscopic examination, as there will be neither dyspnea nor dysphagia.

Paralysis of the arytenoideus muscle produces an open chink posterior to the processus vocalis, with more or less complete aphonia.

Paralysis of the tensors, externally and internally, and of the crico-thyroid and thyro-arytenoideus internus produces a hoarse tone, the cords meeting at the processus vocalis and at their point of insertion on the thyroid.

Paralysis of the adductor group is one of the most common of the laryngeal manifestations, especially as usually seen in what is known as hysterical aphonia of the larynx. Here the adductors fail to meet in the median line during phonation. Examination shows nothing apparently the matter with the cords, and when the mirror is used the cords appear to meet, but without the production of any sound. The history is that the voice has been lost, generally suddenly, sometimes gradually, as the result possibly of nervous excitement, though the causes offered are very various. Attempts at phonation are absolute failures. The voice is a hoarse whisper, difficult to understand. It is commonly stated as most frequent in women, though the author has met with it quite as often in men. Workers in industrial establishments can sometimes talk when the machinery is in motion, losing the voice as soon as the machinery is stopped. The patient is usually very much alarmed and very anxious for relief. Direct stimulation of the cords with the laryngeal sound, the patient at the same time being instructed to phonate, frequently brings about a cure. Strong galvanic currents, applied with one pole directly to the larynx and the other to the back of the neck, or with the poles at the sides of the neck, also bring about good results. Attempts at singing while a strong electric current is employed are very helpful. In several instances after complete failure with the use of sprays, astringents, the sound, and even the mild galvanic current, the sudden application of a very strong current, sufficient to give a pronounced shock, has produced immediate restoration of the voice.

Hysterical aphonia, even when the voice has been once restored, tends suddenly to recur, so that one must not be in the least surprised after a complete restoration of the voice to see the same individual return some days later as aphonic as ever. Persistence, however, in medicinal measures, with general tonic treatment, will usually effect a complete cure.

The above general review of laryngeal paralysis is necessarily incomplete, but is perhaps sufficient for the purpose of this work; since the conditions here mentioned, if at all marked, will require attention both as to diagnosis and treatment at the hands of the skilled laryngologist or neurologist, or possibly both. The reader desiring further information is referred to the larger works on diseases of the throat.

CHAPTER XX.

FOREIGN BODIES.

FOREIGN BODIES IN THE NOSE.

Foreign bodies are found in the nose under varying circumstances. They are most frequent in young children. They occur in adults as a result of external violence from without, as explosions, gunshot wounds and similar injuries; from the insertion of substances used in nasal surgery, or after operation by the patients themselves, as bits of cotton or gauze; in the insane and hysterical; and as the result of the introduction of the eggs of insects.

For reasons which are not very evident, it seems incident to child life for various substances to find their way not only into the mouth but also into the nose and ears. Among those which may be introduced into the nose are beans, peas, beads, stones, fruit stones, buttons, pieces of wood, coins—in fact, any substance that a child could put into the nose.

The *Symptoms* are those of obstruction to breathing, with swelling, mucous discharge, sneezing, perhaps neuralgic pain. Abscess formation, bone destruction and odor will result if the foreign body remains for any length of time. In the case of seeds germination may take place. As a rule the substance is introduced into one side only, though the child may put something into both nostrils. There may or may not be any history, but a unilateral constant discharge in a young child should make one suspicious of a foreign body. It is to be diagnosed from syphilis, sinus disease and malignant disease. It might be supposed that there could be no difficulty in regard to syphilis; but one case has come under my observation, in which a young child was treated for several months for hereditary syphilis because of a foul one-sided discharge which had caused some erosion of the cartilaginous ala. Examination under ether showed the presence of a shoe-button, the extraction of which promptly disposed of all further trouble.

The diagnosis therefore being sometimes in doubt, an examination should be made with care; and as a proper nasal examination of a young child, with the parts considerably swollen, is almost impossible, on account of the constant movements of the child, general anesthesia should be induced and the area carefully explored with a probe. If nothing can be detected in the anterior nares a mouth-gag should be inserted, the forefinger carried behind the soft palate, and the probe passed to the finger, which, placed against the posterior nares, acts as a guide.

The placing of the finger in the naso-pharynx as a guide is frequently quite as important a procedure in the extraction of a foreign body as in the diagnosis. In one instance in which a child had pushed a thin narrow fragment of rubber into the nose it was impossible to remove it, even under general anesthesia, until with the finger in the naso-pharynx the offending body was pushed backwards against the finger and finally grasped with the forceps introduced through the nose. I have several times had great difficulty in grasping a foreign body in the anterior or middle nares, but have always been able to push it backwards so that it touched the forefinger of the opposite hand, and then by carrying the forceps along to the finger have been able to grasp and remove it without further trouble. All operative procedures must be done with great gentleness, so as not to wound normal tissues or remove any of them with the forceps. Cocaine and suprarenal extract are of value in rendering the passages as wide as possible. Bleeding is apt to be pretty free if the foreign body has been in the nose any length of time, as granulation tissue readily forms around it; so that for the most part these bodies have to be removed by the sense of touch.

In the class of cases in which articles are introduced from without by external violence their presence is sometimes not suspected until a long time after. A portion of a stone can be driven into the nose or an accessory cavity as the result of a blast, and its presence be unsuspected for a long time. Army records show the removal of bullets that have been imbedded for many years. One such case has come under my immediate observation, in which a large-sized Minié bullet, which had entered the ethmoid region through the cheek some twenty years before, was finally removed through the nose. A more or less constant pus discharge, pain and headache had been complained of for a long time. These symptoms finally led to an examination of the nose and the removal of the bullet, the location of which had been unknown. The presence of bodies of this kind, when their introduction is either unknown or has been forgotten, can only be conjectured in the individual case, and no special rules of diagnosis can be laid down.

It occasionally happens that pieces of cotton or portions of sponges are left in the nose and forgotten, and later set up trouble in the way of granulations. Careful examination will usually detect these. Nasal plugs occasionally get pushed so far backward that their removal becomes difficult. Here also it may be necessary to pass the finger into the naso-pharynx to push the plug forward or to steady it before it can be grasped by the forceps.

In the case of the insane, articles of one sort and another are introduced into the nose, but where these are suspected it is usually not difficult to remove them under illumination.

Insects sometimes gain admission to the nose without the knowledge of the individual, lay their eggs and later hatch out colonies of maggots. Several such cases have been recorded, mostly from the Southwest.

Rhinoliths are nasal calculi, which form around some foreign body, and remain in the nose for months or years, growing larger all the time. They are composed of the salts of lime, magnesia and sodium, and are usually easily removed with some form of forceps, although they occasionally have to be broken before they can be entirely removed. I have recently removed one in which the centre was a cherry stone. It had been placed in the nose some twenty years before. It was irregular in outline and almost completely blocked the right nostril. The patient came complaining of catarrh.

FOREIGN BODIES IN THE PHARYNX.

In the upper pharynx foreign bodies may be said to be unknown, except so far as the tonsil is concerned, in which fishbones and toothbrush bristles are occasionally lodged. The lower pharynx, around the base of the tongue and at the entrance of the larynx, is a favorite spot for the entrance of foreign bodies of the sharper kind, and lodgment here occurs mostly, though not entirely, in connection with the act of eating. Those which are not introduced in this way occur mainly as the result of the bad habit of putting things into the mouth, such as pins, tacks, buttons, and all kinds of toys and small objects. Pieces of broken pipe, tooth bristles and the like are sometimes lodged in this locality. Among the substances introduced by way of food are fishbones and portions of sharp bones, especially poultry bones. These are found at the base of the tongue, in the pyriform sinus, at the base of the epiglottis, and on each side of the glosso-epiglottic and ary-epiglottic ligaments. When the foreign body is sharp-pointed, like fishbones, pins or tooth bristles, it frequently sticks some distance into the soft tissues, and may be completely imbedded.

The Symptoms are those incident to the body itself, and are accompanied by a history of something having been swallowed which stuck in the throat. Examination, which should always be made with the mirror as well as with the tongue depressor, may or may not show the presence of a foreign body, as objects of this sort are frequently removed either by swallowing or by coughing and hawking, without the knowledge of the person, and yet leave behind them for some hours the impression of being still present. When a foreign body is present the first examination does not always reveal it; hence the examination must be most thorough and systematic, and consist not only in viewing the parts with the mirror, but in touching the entire area complained of with the probe or with a cotton-wound applicator, and also of an examination with the finger. The finger should be protected, or else a mouth-gag inserted; as otherwise the finger may be bitten. The closed angular forceps makes a very good examining probe, and should any foreign body be present the means are already at hand for its removal.

When the foreign body cannot be seen on inspecting the open mouth, but is lying at the base of the tongue, extreme depression of the tongue with the tongue depressor, with the head well forward, may enable one to see it, and to grasp it with the angular forceps. When it lies too far down for this, the laryngoscopic mirror must be used. The parts should be anesthetized with cocaine and adrenalin, and all retching and gagging controlled as well as possible. When the body is at the very entrance of the larynx, and there may be danger of its passage between the cords or into the trachea, control of the retching is of the greatest importance, and a hypodermic of morphia may be required.

If the patient is seen after the body has been expelled, a general redness resulting from the retching will be all that is visible on examination. Patients are frequently very insistent on the presence of the body when none is present. Pieniazek relates the case of a physician who imagined he had swallowed his artificial teeth. Nothing could be found on examination, and later the teeth were found under the mattress.

The hyoid bone sometimes shows through the mucous membrane, and can generally be felt with the finger, but must not be mistaken for a foreign body, although the patient will sometimes say that the proper place has been touched when the finger comes against the hyoid bone.

FOREIGN BODIES IN THE LARYNX AND TRACHEA.

The entrance of foreign bodies into the larynx is unfortunately comparatively common, and is an incident of the greatest gravity whether occurring in childhood or adult life, death not infrequently resulting directly or indirectly from their introduction. They may lodge between the cords, in the sinus between the true and false cords, below the cords or in the trachea; and the same substance may be at different times in all of these from above downwards. The narrowest part of the larynx is at the cricoid cartilage, and substances passing the cords and not reaching the trachea will usually be found at the cricoid ring. Among the substances gaining lodgment are coins, small marbles, safety-pins open and shut, pieces of fish and animal bone, nut hulls, pieces of toys, and all sorts of small objects, metallic, mineral or wooden. The usual method of introduction is for the substance to be first held in the mouth or between the lips, when, as the result of a sudden quick inspiration, it is drawn down into the larynx.

A great many foreign bodies have entered through the tube after the operation of tracheotomy. Among these are corks, cleaning feathers, and pieces of the tracheotomy tube, metal or rubber.

The first *symptom* is cough, and perhaps suffocation, depending on the size and shape of the body and whether it completely closes the glottis or not. A few cases of immediate suffocation and death are recorded. I have seen one in which a person eating meat very rapidly, coughed and then had a deep inspiration, with which he drew a large piece of meat into the glottis and below the vocal cord, where it lodged, and suffocation and death occurred in a few moments. At the autopsy the piece of meat was found lodged tightly in the larynx. This case could in all probability have been saved had any one been at hand to do an instantaneous tracheotomy.

The *diagnosis* of these foreign bodies in the larynx and trachea may be very much in doubt, especially in children, owing to the unreliability of the history or the entire failure to obtain any statement from the young child, so that subjective symptoms have to be depended upon. The absence of expected symptoms must not mislead, as at the time the case is brought to the physician's notice there may be no striking symptoms, the foreign body not causing any special irritation for the time being. The presence of a cough, hoarseness or difficult breathing are all of the greatest diagnostic importance, and yet these may be entirely absent. Cough is not likely to be a prominent symptom, unless the foreign body is a movable one and is moved upward and downward by the inspiratory and expiratory currents of air. Inasmuch as the mucous membrane of the trachea is less sensitive than that of the larynx, there may be quite a little of this movement with only slight resulting irritation. Auscultation of the trachea and larynx should always be done, as the noise made by the substance moving up and down the trachea may give important information, as will also the character of the breathing. Whether there is any difficulty in swallowing will depend upon the location and shape of the foreign body, especially the shape, and it is not likely to occur unless it is comparatively high up in the trachea or in the larynx. If the substance falls down into the trachea it is more apt to drop into the right bronchus than into the left; and on account of the anatomical conformation of the principal branches of the main bronchus on the right side, the foreign body is most likely, if it goes further, to pass on into the bronchus which supplies the lower lobe of the right lung. If the principal bronchus is closed its air supply can be cut off, and there may be no symptoms until the appearance of a pneumonia or an atelectasis, some time later. If a still smaller bronchus is closed no absolute diagnosis may be possible. Small smooth substances may remain for a long time without producing any symptoms, and their presence may be first revealed when they are coughed up.

The *prognosis* will depend upon the conditions existing in the individual case. While the presence of foreign bodies in the larynx, trachea or bronchi is always a grave matter, the mortality is at present not extremely high. In pre-laryngoscopic days the mortality of foreign bodies in the trachea was stated as 41.2, and after the advent of the laryngoscope and cocaine it was given as 30 per cent. At the present time, with the aid to diagnosis furnished by the X-ray and with the employment of aseptic surgery, the mortality is probably very much less, though I have no figures covering the point except those of Pieniazek, who had one death in ten cases, a mortality of ten per cent.

The *treatment* will depend upon the diagnosis and the position and shape of the foreign body. In the case of a child, if seen at the time the body is swallowed, quick inversion of the entire body or the placing of the body over the edge of the bed, with the head and shoulders supported by the hands on the floor, may bring about explosive coughing sufficient to remove the offending body, and in many instances this results, especially if the substance be not too sharp. Simple methods of provoking cough, as tickling the fauces with the finger or a feather, are allowable. Emetics are not to be recommended, as vomiting is followed by a deep return inspiration which may carry the foreign body further down than ever. Substances will sometimes be coughed up several days after their entrance, and most small substances will be coughed up sooner or later. If simple treatment of this nature fails to remove the body, or if one is not called to the case until some time after the introduction, the laryngoscopic examination should first be made and all information sought as to the probable history. If it is impossible to make a laryngoscopic examination without, as is frequently the case in children, it should be done under anesthesia. In adults a hypodermic of morphia will frequently aid very much, as it lessens the local irritability; while cocaine and adrenalin used locally are most valuable auxiliaries. In the case of metal objects the most valuable information is at present obtained by means of the X-ray, which shows the shape of the body and approximately its location as to height; but inasmuch as the trachea and esophagus lie side by side, the question as to whether the foreign body is in the one or the other may be very much in doubt, owing to the fact that the widest part of the esophagus corresponds to the lowest part of the trachea and the beginning of the right bronchus.

A case which recently came under my observation will illustrate some of the points just mentioned. A little girl of five years had a small open safety-pin, seven-eighths of an inch long and half an inch wide when open, in the mouth. In some way she drew it into the throat, and told her mother that she had swallowed it. There were no symptomsof cough. A physician was called, who examined the larynx, and seeing nothing, was uncertain whether the pin had been really swallowed or not, or if swallowed, had not passed on to the stomach. Some slight coughing and a little bronchitis supervening, the physician was again called some five days later. The following day he took the child for examination under the X-ray, where the presence of an open safety-pin was seen through the fluoroscope in a position corresponding to that of the larynx. I was called to the case with the information that tracheotomy might be necessary. Examination with the fluoroscope showed the presence of an open safety-pin, as above stated, pointing forward in the region of the larynx; but we were uncertain whether it was in the larynx or the esophagus. Desiring to be more certain of the diagnosis, the child was given chloroform, and I made a careful examination with the mirror, but could see no sign of any pin. A sound was then passed into the esophagus, and nothing being felt it was removed and gently passed down between the vocal cords. Here also nothing was felt, so an attempt was made to see in the fluoroscope the position of the sound with reference to the pin. At this moment the child unfortunately vomited, and on further examination with the fluoroscope no trace of the pin could be found. Nothing further was done at this time. The prevailing opinion was that the pin was in the esophagus, but the radiographist held that it was still in the trachea and had dropped down to the region of the right bronchus as the result of the manipulation or the vomiting. A few days later and on several other occasions further X-ray photographs were taken and the pin finally discovered lodged in the right bronchus. During all of this time the child was happy and well and had practically no symptoms, and had it not been for the X-ray pictures no one would have believed that there was any open safety-pin in the trachea. Twenty seven days after the introduction of the pin, the child was taken to the Massachusetts General Hospital, in the service of Dr. Maurice Richardson, who was also in doubt as to the presence of the pin until repeated X-ray photographs taken over a week's time had agreed with those previously taken. The child was then etherized, and the esophagus explored. Nothing being found a low tracheotomy was then very slowly and deliberately done, so that the trachea was entered with hardly the loss of a drop of blood, when with the aid of long angular forceps the pin was located, and at the fourth or fifth attempt removed. This was thirty-four days after the introduction into the larynx, and twenty-seven after its reaching the trachea and right bronchus. It is probable that if high tracheotomy had been done the first time I saw the child the pin would have been found at about the region of the cricoid cartilage and easily removed; but as the question of diagnosis was uncertain and the conditions for tracheotomy at that time and place not ideal, it seemed best to be more certain of the diagnosis; and the manipulations to this end probably dislodged the pin, which then dropped into the right bronchus.

A case has come within my own knowledge in which a fragment of peanut shell which was sucked into a young child's trachea caused death.

In all cases, when a foreign body has been positively diagnosed as being in the trachea and is not removed in a few days, the operation of tracheotomy should be done before any dangerous symptoms supervene and the risk of operation is increased. The tracheotomy wound must be laid widely open, and the operator ready to catch the foreign body, as there is some danger of impacting it in the glottis if it is thrown up by the violent expiratory effort which usually follows the opening into the trachea. The wound can either be closed at once or a tube worn for a day or two until the surface edema and swelling have disappeared, so as to avoid the danger of emphysema. In cases in which tracheotomy has been done without result, the tube should be retained a few days, as the foreign body may be coughed up through the tube.

Extremely large bodies, larger than would be thought possible, sometimes get into the trachea, and even down to the bronchi. Schrötter has reported a case in which an artificial plate with four teeth attached passed into the trachea and became impacted there. Pieniazek has reported a number of cases of removal of objects which had reached the bronchi. In several of these he was able by means of a tracheoscope of his invention to see the body in situ and then to grasp it with forceps. Among the substances removed were pieces of cork, hairpins, portions of tracheotomy tubes, and the widest part of a feather. In one instance he removed from the main branch of the right bronchus a piece of steel wire, sharp at one end, with a round knob at the other, which was situated at a point seven and one-quarter inches in depth from the tracheotomy opening to the point where it was grasped with the forceps. Killian has removed a piece of bone from the right bronchus by means of his autoscope, but this method is not adapted for general use. Before grasping any substance with the forceps, its location and probable shape should be determined with the closed forceps acting as a probe, and in the case of sharp bodies every endeavor should be made to remove them with the least amount of wounding of the parts; so that neither haste nor force ought to be used.

FOREIGN BODIES IN THE ESOPHAGUS.

While the affections of the esophagus are not strictly within the line of subjects discussed here, foreign bodies in the esophagus merit consideration in connection with those of the larynx; as the patient is frequently uncertain whether he has sucked the offending body into the larynx or trachea or whether he has swallowed it. Among the substances most commonly swallowed and which become lodged in the esophagus are artificial tooth-plates with one or more teeth attached, silver dollars, pieces of food, pins, tacks, straws and the like. The artificial teeth are frequently swallowed in the night. The point of impaction is usually in the middle third, where the esophagus is crossed by the left bronchus, or at the cardiac extremities, where the tube is the narrowest The condition is one of extreme seriousness, and foreign bodies which remain any length of time produce grave symptoms, such as dyspnea, dysphagia, edema, abscess formation, ulceration of the esophagus, and even perforation of the pericardium. Pieniazek records a case in which a piece of sharp bone passed through the wall of the esophagus and penetrated the aorta, causing death; and Roe mentions a case in which a tooth-plate was lodged in a diverticulum of the esophagus for nearly two years, being suspected, but not detected during life.

The diagnosis depends upon the history, the symptoms and the help of the X-ray.

Removal through the natural passages may be difficult or impossible, while external surgery is fraught with grave risks, owing to the extreme liability of infection of the tissues and the danger of emphysema, pneumonia, and general septicemia. When a foreign body is removed externally, the case frequently does well for two or three days, when sepsis supervenes, high temperature occurs, and death results. When the body is comparatively small and is one that can do no harm if it pass down, the esophageal sound can be used to push the body down, or the bristle probang may be employed to pull it upwards. The induction of cough or vomiting may sometimes bring up the foreign body. When the foreign body is a piece of meat, as not infrequently happens in the esophagus, artificial digestion may render it smaller.

In the case of impacted bodies no attempt whatever should be made to remove them until the diagnosis as to position can be made, and where possible every attempt should be made to remove them by the natural way before resorting to external surgery. In children, small coins, such as pennies and twenty-five cent pieces sometimes get stuck, and for these the coin-catcher made by Leiter, of Vienna, answers very well. With the child's head thrown back it can be passed down into the esophagus, and on its withdrawal will bring the coin back with it. I have seen an Austrian kroner removed in this way, and a friend of mine recently removed a cent from a young child in the same manner. In this latter instance pressure of the instrument and the coin against the back of the trachea caused temporary asphyxiation, and tracheotomy had to be done. As soon, however, as air freely entered the trachea, the instrument was again used and the penny was finally withdrawn. Recovery was complete and rapid.

The esophagoscope can be used, but is annoying and difficult to handle. Before attempting to remove a foreign body from the esophagus, preparation for tracheotomy should be made. When the substance has already passed on into the stomach, soft bulky foods such as potato, oatmeal and bread should be given in considerable quantity.

CHAPTER XXI.

TRACHEOTOMY.

This operation is done in order to obtain direct communication between the lower breathing apparatus and the external air. It is an operation which can be done either very quickly or very deliberately according to the conditions present. When performed in an emergency it is always on account of some pathological condition which is threatening the life of the individual, and with the hope of saving that life. As a whole its mortality has been comparatively high, not so much because of the operation itself as on account of the concomitant conditions for the relief of which it is done. At present its mortality is diminishing, since it is resorted to as an emergency procedure in diphtheria less frequently than formerly.

While the technique of the operation is often comparatively simple, it is at times very difficult, and taken into consideration with the conditions under which it is done the operation must be regarded as one of the graver surgical procedures, the outcome of which must frequently be in doubt. It is an operation the need of which may appear without the slightest warning, and in the absence of many of the conditions commonly regarded as necessary for good surgery. Every practitioner should therefore be familiar with its technique and with the surgical anatomy of the region, and be prepared to perform it on the shortest notice and with such means as are at hand.

Tracheotomy may be urgently demanded in cases of suffocation, actual or threatened, from foreign bodies; in sudden edema of the larynx in which suffocation is present or threatening; and in cases of false membrane in the larynx or trachea, as in diphtheria and croup. The necessity for tracheotomy in these diseases has diminished in recent years, owing to the introduction of the less dangerous procedure of intubation, and even more largely to the use of diphtheria antitoxin, whereby the threatening symptoms of laryngeal dyspnea are to a great extent obviated.

In the case of malignant affections of the laryngeal region, tracheotomy is frequently necessary both for the relief of dyspnea and as a preliminary to operation for the removal of the growth.

Tracheotomy is also done as a temporary procedure in operations such as cleft palate and others in the mouth, when it is desirable to prevent all breathing through the mouth or nose for a short time.

Abductor paralysis of the larynx occasionally requires tracheotomy for the relief of the consequent dyspnea.

Surgical Anatomy.—The area to be considered includes the thyroid and cricoid cartilages and the trachea as far down as the sternal notch. The trachea lies at the very front of the neck. It is easily felt by the examining finger in both adults and children, but it is always really deeper than is apparent on palpation with the finger. The thyroid cartilage is easily felt just below the hyoid bone. Below this is the cricoid, and between them the crico-thyroid membrane, which latter point is the one at which emergency tracheotomy can be most readily performed. It is also one of the landmarks for the operation, and is found with comparative ease. Below the cricoid come the first and second rings of the trachea, and then the isthmus of the thyroid gland, which latter connects the two lobes of the thyroid and is itself covered by a venous plexus which joins the thyroid veins on each side. (See Fig. 68.)

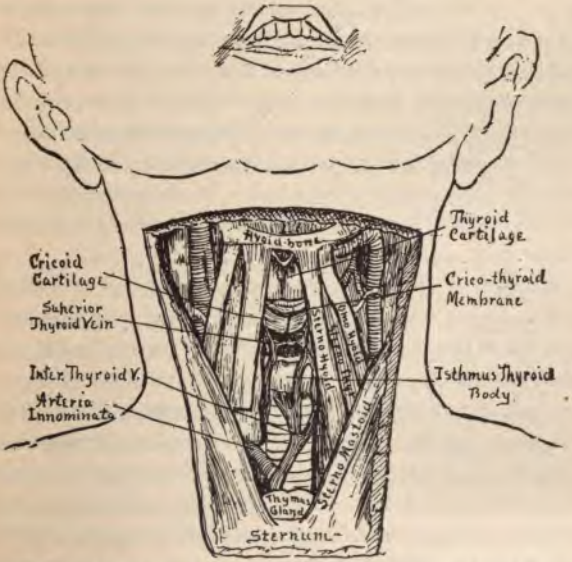

FIG. 68.—Surgical anatomy of larynx and trachea showing region involved in tracheotomy and laryngotomy. (After Gray.)

The thyroid isthmus is somewhat variable as to its location, sometimes covering the second, usually the third and fourth rings. Below this are found the remaining rings of the trachea. Over the thyroid and the portions of the trachea which are covered by the thyroid are several layers of fascia and two sets of muscles which meet in the middle line,—the sterno-thyro-hyoid, made up of the sterno-thyroid and thyro-hyoid muscles, and in front of this the sterno-hyoid. These are again covered with two layers of fascia and various veins, chief of which are the anterior jugular on each side, which frequently communicate, and over which is the skin. Having no fixed bony attachments, the trachea is quite movable. In the child it is much smaller, more deeply placed, and more movable than in the adult. The distance from the cricoid to the sternum in children between three and ten years varies from one and three-eighths to two inches. The average diameter in children between two and five years is from five-sixteenths to one-half of an inch. In the adult male it is five-eighths of an inch, and in the female four-eighths of an inch.

Except in the case of anomalies and the occasional presence of the thyroidea ima artery, which is a branch of the innominate, the bloodvessels liable to be met with are entirely venous; but, owing to the conditions of congestion which are likely to accompany the need for the operation, the bleeding from them may be very annoying, and provision should accordingly be made for it. The anastomoses of the deep and superficial veins occur mostly over the thyroid and over the sternal notch.

The operation and its details will first be described as a deliberative procedure, both high and low, and consideration will then be given to the best method of doing it as an emergency operation.

Anesthesia. The question of anesthesia is of some importance. When there is plenty of time and no symptoms of suffocation, ether anesthesia answers very well both for children and adults. It, however, much increases the degree of venous congestion, and in comparatively young children chloroform is preferred by most operators. In emergency cases chloroform has the advantage that anesthesia is produced more quickly and with less sense of suffocation. So far, therefore, as ether and chloroform are concerned, the decision must be made in the individual case, with a leaning towards ether on the ground of safety, provided there are no special symptoms of suffocation.

I have found local anesthesia to answer very satisfactorily in the case of adults. This with the aid of adrenalin chloride gives an anesthetic and practically bloodless field of operation. I take the tablet known as the Schleich anesthesia tablet, containing cocaine hydrochloride, 1-5 grain, morphine hydrochloride, 1–40 grain, sodium chloride, c. p., 1-5 grain. Two of these tablets are dissolved in sixty minims of a previously boiled one to five-or-six-thousand solution of adrenalin chloride. One hypodermic syringeful of this solution is then injected along the site of operation, the syringe is refilled, and as the operation progresses, if pain is experienced, an occasional one or two minims is again injected, the second syringeful containing a sufficient quantity to complete the operation.

Two assistants are desirable, one is essential. The instruments necessary are: a small scalpel, a small probe-pointed straight or curved knife, a director, half a dozen pairs of artery forceps, a pair of mouse-tooth dressing forceps, a blunt-pointed retractor, a pair of sharp double hooks or two sharp-pointed hook retractors (those retractors which are used for mastoid operations answer very well), an aneurism needle and a tracheal canula. The canulæ vary in size according to the age of the patient, being five, six and a half, eight and ten millimetres in diameter.

The patient should be placed on a table (see Fig. 69), and if artificial light is used the light must be directly overhead, or else the operator should wear a forehead mirror, so as to be able to throw the light directly on the wound. The table used should be as narrow as possible. The patient's head should be extended and a small hard pillow or piece of wood placed under the back of the neck, so as to throw the trachea and larynx into strong relief.

The operative area must be prepared as for any other aseptic operation, and the details in the way of aseptic sponges, dressings, towels and the like carried out as carefully as the circumstances in the individual case will permit.

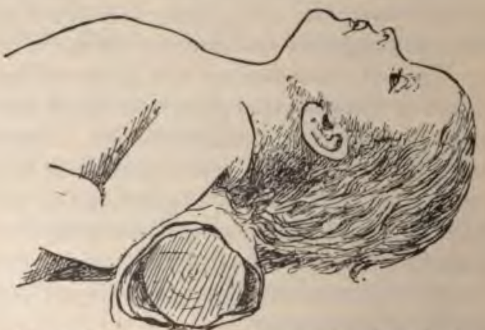

FIG. 69.—Position of child for the operation of tracheotomy.

Standing on the right of the patient, the operator grasps the trachea at the point desired for incision, pressing the skin down equally on each side. An incision is then made exactly in the median line, beginning at the upper border of the thyroid cartilage and going downwards about two inches. The first incision is made right through the skin to the superficial fascia. The skin is pushed down on each side, held apart with the aid of retractors, and the fascia picked up with forceps and cut through while on the stretch. Any veins that are present are avoided if possible; if not, they are grasped by artery forceps, and divided between the forceps. Underneath the superficial fascia is the first layer of the deep fascia. This can be divided very well by first nicking with the knife and then slipping the director along and cutting on it. Every cut is to be made in the exact median line, and the parts are immediately drawn downwards to the side with the retractors. After dividing and pushing away the first layer of the deep fascia, the dividing line of the groups of muscles will be seen. The muscles can be separated by the handle of the scalpel, or by light incision with the back of it, and drawn to one side. As soon as this is done the deep fascia comes into view, more veins appear, and one comes down against the upper border of the thyroid isthmus. If there is not now sufficient room, the thyroid isthmus can be drawn downwards with a blunt retractor. The muscles and all parts being drawn to one side, the trachea now appears, covered only by the deep fascia. This fascia can be divided longitudinally on the director or horizontally over the cricoid. In the latter case it is stripped from above downward. The trachea now being in full view, the cricoid cartilage and the crico-thyroid membrane are seen. All bleeding should be staunched before anything further is done, and all parts put on the stretch, with the trachea presenting as far forward as it is possible to get it. With a sharp scalpel guarded with the finger, except for the first quarter inch of its length, so as to avoid any danger of injuring the posterior wall, and with the blade of the knife towards the thyroid, and the thyroid isthmus drawn downward if in the way, an incision is made between the second and third rings directly into the trachea and carried upward to the lower border of the cricoid, and in quite young children, in whom the trachea is short and small and the rings close together, through the cricoid as well. A peculiar swishing sound is immediately heard, owing to the suction of air into the trachea, followed at once by a spasmodic cough. The sides of the tracheal wound may be opened with a retractor or a pair of nasal forceps or with any smooth object, as the handle of a scalpel, so as to allow the air to enter freely into the trachea. The so-called tracheal dilators are of no special value. A temporary suture through each wall makes a good retractor. The sides of the wound should all this time be kept thoroughly retracted and the trachea thrown away forwards.

As soon as quiet breathing is attained and the hemorrhage is stopped the tube may be introduced. The tracheal incision should be about one and a half times the diameter of the tube, but not much longer. If the opening is not large enough the probe-pointed knife is used to enlarge it. The tube is introduced sideways, then brought into the vertical line and slipped into the trachea. The immediate expulsion of blood and air will show whether the right point has been reached or not, as can also be ascertained by placing the finger over the tracheal wound. If the incisions have been made in the median line and the opening into the trachea also has been made directly in the center, there will be but little trouble in introducing the tube. The difficulties up to this point occur from being unable to staunch the blood sufficiently, from a failure to make all incisions down to the trachea in the median line, or from the failure to incise the trachea itself absolutely in the median line. If the patient has a very short, thick neck, it adds considerably to the difficulty of the operation. In such cases it is sometimes very difficult to find the trachea, and it has occurred that the tube has been inserted at the side of the trachea, but this ought not to happen if sufficient care is taken to keep the tension of the two sides uniform. Emphysema of the tissues will occur if the trachea is opened on the side, if the dissection is not sufficiently thorough, or if the fascia is not entirely removed from the area to be incised.

After the insertion of the tube the patient should be turned over on the side, with the head lower than the body, so as to favor the coughing up and loosenening of any blood clot which may have been formed. On putting the patient again on the back, if the breathing is quiet and satisfactory, the tube is again removed to see that everything about the wound is right. It is then reinserted, and the soft parts sutured together nearly but not quite to the tube, since allowance must be made for the swelling of the tissues, which always occurs. The index finger will be found a more satisfactory instrument than any other in case of difficulty in reintroducing, as a little stretching of the wound is easily made with the finger, the necessary degree of which is readily estimated. A tape should be tied around the tube tightly enough to hold it in position, but not too tightly. The inner tube should be taken out frequently for cleansing purposes, a nurse being always at hand to prevent its becoming blocked. A piece of gauze kept constantly moist and of sufficiently coarse texture not to interfere with the passage of air should be kept over the tube.

For the *Low Tracheotomy* the point of election is below the isthmus of the thyroid gland. The trachea here is deeper and consequently harder to reach, especially in a person with a short, thick neck; and this operation is seldom done in children. In adults, and for the extraction of foreign bodies in either adults or children, it is frequently performed, as it allows more room for manipulations on the larynx, and in the case of foreign bodies which are lodged in the region of the bronchi renders them more accessible. The details are much the same as for the high operation except that the initial incision begins at the lower border of the cricoid and extends to the sternum, and the isthmus of the thyroid is to be drawn upward. There are fewer veins here. The after-swelling is considerable, and care is to be taken that the tube does not slip out, as the fat and subcutaneous tissue are rather more abundant.

When cutting of the veins is unavoidable, the first hemorrhage is apt to be considerable, but soon diminishes, and if the vessels are clamped temporarily, it is seldom necessary to tie them.

If local anesthesia with the cocaine-adrenalin solution is used, the degree of venous bleeding is very much diminished. I have performed low tracheotomy with this agent as an anesthetic with comparatively little bleeding.

While it is desirable to do tracheotomy either above or below the thyroid, it occasionally happens that the thyroid has to be entirely disregarded, and the cut is made through the isthmus, with provision for staunching the hemorrhage. This need not offer any insurmountable obstacle. No vein should be cut until it has first been clamped, a few cases being on record of death from the entrance of air into the veins.

Emergency Operation.—This is best made directly through the cricoid or in the crico-thyroid membrane, in the latter case with the knife pointed downward. The crico-thyroid membrane is usually readily found, is quite high up, and the trachea can be as quickly and more readily reached here than in any other place. Put the parts on the stretch; grasp the trachea firmly; make incision with a sharp scalpel—even a pocket knife has answered on occasion; make one quick skin cut to the trachea and then another incision through the trachea; and introduce the tube. If no tube is at hand, thread two needles and put one suture on each side of the opening in the trachea and fasten them back with plaster. These will hold the wound sufficiently open until a tube can be obtained.

The length of time for the wearing of the tube and the details of the after-treatment depend entirely upon the purpose for which the operation is done. In case of diphtheria the tube will have to be worn from one to several weeks, and when the operation is done in connection with other surgical procedures the length of time that the tube must be retained will depend entirely upon the primary conditions for the relief of which the operation is done. In general, a week will be the minimum time. Its final removal is sometimes delayed by the failure of the patient to breathe properly on its removal. This may be due to paralysis of the muscles or to lack of use, and is a temporary condition only.

The tube should be neither too large nor too small, should not press sharply on the posterior wall of the trachea, and should allow the free passage of air. I do not regard a fenestrated tube as of any great advantage, granulations being more likely to form around it, and sufficient air will usually pass around the tube in any case to allow the patient to speak if desired. If emphysema of the tissues occurs, it usually disappears in a few hours.

On account of the blood which may enter the lung, and because of the changed conditions of breathing, a broncho-pneumonia not infrequently occurs, and may be attended with fatal result, In one instance in which I did a median tracheotomy—that is, between the second and fourth rings—for cyanosis in a case of carcinoma of the larynx, a well-marked pneumonia followed on the third day, and an unfavorable prognosis was given. Not wishing the patient to die in the hospital, he was removed to his home in the ambulance, and on the way, but unknown to anybody at the time, the tracheotomy tube slipped out and a great deal of mucus was coughed up. This tube was evidently too small, and when I saw the patient a few hours later I made no attempt to put back the silver tube, but substituted for it a piece of hard rubber tube slightly elipsoidal in shape, and of greater calibre. Recovery from the pneumonia took place. In this case the tube was evidently too small and did not carry sufficient air, and perhaps it slipped out of the tracheal opening when unobserved, so that it became a partial obstruction. Hence in every case as large a tube as the trachea will comfortably take should be provided.

In cases of diphtheria the outer tube should be removed each day, so as to allow for the coughing up of any membrane which may be present. The sutures should be left in at least a week, as union of the divided ends is comparatively slow, owing to the constant motion, and quite as frequently takes place as much from granulation as by first intention.

Secondary hemorrhage is rare, but has occurred.

Unless the asphyxia is extremely threatening, do the operation deliberately; but a few minutes will be required even when done carefully, and the risk is thereby very much diminished. If possible always do the operation before dangerous or urgent dyspnea has supervened. Some local sepsis,redness and erysipelatous appearance of the tissues around the wound is not uncommon, but is not as a rule a true erysipelas.

Laryngotomy.—It may happen that the thyroid cartilage is the best place for the incision, but it is always to be avoided if possible, owing to the danger of injury of the vocal cords. When it is done—as may be necessary for the removal of a foreign body—incision is made in the median line. A small cross incision is made as an aid to the approximation of the wings when they are again sutured. The two wings are drawn aside by retractors, giving a view of the interior of the larynx. The foreign body is removed, or the procedure for which the operation was done is accomplished, and the two wings then sutured with catgut in exactly the same relation to each other as before, otherwise the vocal cords will not phonate properly. The skin incision is also closed by sutures.

CHAPTER XXII.

INTUBATION.

To a certain extent intubation has taken the place of tracheotomy in the case of obstructive laryngitis in young children. Its technique while generally thought to be difficult is really comparatively simple, and with the aid of the necessary apparatus the operation should be feasible for any practitioner who has a mental comprehension of the anatomical relationship of the parts. A description of the tubes and apparatus is not necessary here, as they are figured in every surgical instrument list and are well known. The best outfit is that known as O'Dwyer's.

The child is firmly held in the upright position in the lap of a nurse, the knees being between the nurse's knees, and the arms secured by her, with the head lying against her right shoulder. A mouth-gag is inserted, and should be looked after by a second assistant, whose duty it should be to see that it does not slip out. With the child facing a good light the operator takes the introducer and the tube, the latter of the size corresponding to the age of the child, and previously threaded, in the right hand. The forefinger of the left hand, guarded by a close-fitting rubber finger-cot, is carried along the base of the tongue until the epiglottis is felt. It is then lifted up over the epiglottis, and the epiglottis drawn somewhat downward and forward until the finger is felt to be over the chink of the glottis, at which point it is left, being slipped sufficiently to one side or over it to allow the air to pass.

We are now ready for the introduction. With the right hand the tube is carried back into the throat down along the right side and edge of the left forefinger until it has gone as far as the tip of this finger. The finger is now placed directly over the chink of the glottis, and the tube pushed sideways against it so as to to push the finger to the left and away from the glottis and to occupy with the tip of the tube the point previously held by the tip of the left forefinger. This being reached the tube is pressed gently downward, and slightly forward, in accordance with the position of the child and the line of direction of the trachea, when, if the procedure has been properly done, it will be felt to slip downward and into the larynx. The forefinger of the left hand is placed over the lip of the tube. the introducer withdrawn, and the tube pushed downward as far as it will go. The string is now attached to the outside of the cheek and the operation is over. If the detail is carried out there can be no possibility of the tube being pushed into the esophagus by mistake, or of failure to introduce it. Should the child cough or gag so that the steps of the operation as described cannot be carried out, desist for the moment and then begin over again.

CHAPTER XXIII.

SYPHILIS.

If chancre of the lip be excluded, the primary manifestations of syphilis as seen in the upper air tract are comparatively rare. The initial sore is perhaps more often seen in the nose than elsewhere in this region, and here the infection is probably due to the finger-nail, which has carried the syphilitic virus. Its point of location will be just within the vestibule, probably on the cartilaginous portion of the septum, and may very likely be overlooked altogether. Cases of this kind have occurred as often in physicians as in any other class of people; various cases having been reported in which after examination of a syphilitic person, a portion of the virus has been retained by the finger-nail, and the nose been inoculated thereby. The lesson from this is obvious, and physicians in their relations to syphilitics must not forget the possibility of they themselves becoming infected.

Primary infection of the tonsil and pharyngeal wall occurs occasionally. This is probably most frequently caused from kissing and by infection from pipes and drinking cups, but doubtless also results from unnatural sexual relations. It has also been reported as occurring from the use of unclean surgical instruments, especially the Eustachian catheter. In the case of the tonsil an abrasion or diseased follicle is probably necessary, the virus reaching the seat of disease by suction or swallowing. The primary sore on the tonsil has the appearance of a small, superficial ulcer, covered at the base with a dirty gray secretion, and accompanied by general induration of all the immediate area. Examination with the finger is necessary for a sure diagnosis. In connection with the primary sore there may be pain, radiating to the ear, with a coppery red color of the pharynx on the affected side. Much the same appearances will be present if the soft palate or the pharyngeal wall be the seat. The primary sore in the larynx is almost unknown.

Secondary Syphilis.—Secondary manifestations occur in the upper air tract from three to twelve months after the primary lesion. At first they are those of a simple catarrh, with no particular diagnostic characteristics apart from the history, except that recovery is much slower than in ordinary simple inflammation. Objectively, syphilitic rhinitis can hardly be distinguished from an ordinary rhinitis, except that it has little tendency to get well in the absence of specific treatment. Much the same thing is true in the pharynx and larynx, the symptoms being those of an ordinary catarrh of the region, only more protracted in its course.

Following the simple inflammatory manifestations appears the mucous patch, a characteristic lesion of the secondary stage. This may occur in the nose, naso-pharynx, pharynx, tonsils, faucial pillars, base of the tongue, and larynx. It appears as a slight elevation of the mucous membrane, may be round or oblong in shape, is from one quarter to one-half an inch in diameter, and grayish-white in color, looking as though the surface had been lightly touched with silver nitrate. The superficial epithelium may be denuded, and if so the covering of the patch will be a thin, muco-purulent one. There may be several of these mucous patches, and as they pass away some loss of tissue and an easily-bleeding sore surface are likely to result. This superficial erosion can proceed to deeper ulceration.

When the tonsil is affected it is considerably swollen and has a boggy appearance. Several times I have had such patients present themselves on account of the general swelling of the throat, and on the first look the natural diagnosis would have been one of hypertrophied tonsils. This is the more likely to be the case if the peculiar white appearance of the mucous patch has passed away. Here the history is of considerable value in the diagnosis, and this is especially the case if the condition has lasted some weeks without any improvement. The whole mucous surface of the pharynx and tonsils may have a coppery, glazed look, and if this is the case and the surface is covered with a thin secretion it is very suggestive of secondary syphilis, even when there is no confirmatory history. Whenever there is a history of an angina, lasting longer than four weeks, and in a practically stationary condition, it may safely be considered as probably syphilitic, in the absence of any other sufficient cause. The presence of a mucous patch, either recent or broken down, will help to confirm the diagnosis. If the mucous patch is on the surface of the pharynx, buccal surface of the tongue, or soft palate, it is more likely to be overlooked than when on the tonsil or palatine arches. If it is in the nose it may entirely escape observation, unless the physician seeing the case examines the nose as a routine measure.

Enlargement of the lymph glands I have not found to be a very reliable sign by itself alone, though confirmatory. It seems to me that more cases of enlarged glands are non-syphilitic than syphilitic.

As the throat and nose manifestations of the secondary stage are not as a rule very troublesome to the individual, they may be overlooked entirely and not brought to the attention of the physician unless the patient is under treatment for other syphilitic lesions.

In the larynx the mucous patch may be followed by erosions, and the voice be rough and hoarse, with an irritating, tickling cough, especially if the arytenoids are involved.

The treatment of the secondary stage should be the general treatment of the disease. Beyond keeping the surfaces absolutely clean, local treatment does not materially influence its progress. A cleansing alkaline wash for the nose or throat, with the application of nitrate of silver, five per cent. solution, to the mucous patch, is all that is necessary. Internally, mercury, in the form of the protoiodide, ¼ to ½ gr. doses, biniodide, ⅛ to ¼ gr. doses, or corrosive sublimate, $\frac{1}{20}$ to $\frac{1}{12}$ gr. doses should be employed. I have ordinarily used the protoiodide of mercury in one-quarter grain doses. Mercury by inunction has always been recommended, and in no other way can the system be brought so rapidly under the influence of the mercurial. This treatment has the disadvantage of being rather disagreeable. A dram of the ointment is rubbed in every other day for two weeks, then stopped for a week, and then begun again, the interval between these applications being lengthened according to symptoms. The mouth and teeth are to be kept very clean, and salivation watched for. The mercurial is omitted when salivation occurs, although a moderate amount is readily borne. For the mouth, tincture of myrrh, one part to twenty-five of water, chlorate of potash tooth pastes and washes, and the various antiseptic washes will be found serviceable.

The patient ought to be kept under observation for two years. The amount of medicinal treatment is to be determined by the symptoms, being intermitted for periods of a month or more after apparent cure, but not discontinued.

Tertiary Stage.—The tertiary manifestations in the upper air tract appear anywhere from three to fifty years after the initial lesion. Not infrequently it is difficult to draw the exact line between the secondary and tertiary stages. On account of the length of time which elapses between the primary lesion and the tertiary manifestations, the symptoms are frequently wrongly interpreted or entirely overlooked. The patient himself has frequently forgotten about the original trouble, or at least places no causative relation between it and the symptom of which he complains, and in the case of women, may never have known what the original cause was. Syphilis is a disease the past or present of which it is usually thought desirable to conceal; hence all histories are apt to be unreliable, and the diagnosis should not hang on the presence or absence of a satisfactory history, but should depend on the symptoms. An endeavor should always be made to obtain a history, but the essential thing is the recognition of the affection. The diagnosis is sometimes clear; again it may be very difficult, owing to the lapse of time since the primary infection and the well-known habit which syphilis has of simulating nearly every one of the more chronic affections of the body. I have elsewhere reported a case of perichondritis of the larynx, in which a history of syphilis thirty-five years before was obtained, and in which rapid improvement took place under large doses of iodide of potassium. The diagnosis of syphilitic perichondritis was made. The final course and the histologic examination, however, showed the perichondritis to be carcinomatous. Possibly both conditions were present, as a syphilitic person is as liable to suffer from carcinoma or tuberculosis as anyone else—perhaps more so, since the syphilitic condition lowers the powers of general bodily resistance.

The early manifestation of the tertiary period consists in the formation of the gumma. This is a round-celled infiltration, affecting the superficial and deep layers of the mucous membrane. It is at first elevated above the surrounding tissue, later breaking down in the centre from the insufficient blood supply. The periglandular and vascular tissues are pressed upon, their caliber markedly diminished, and an endarteritis obliterans set up. The extent of the gummatous deposit and the rapidity of its destruction are an index of the virulence of the virus. No portion of the upper air tract is exempt from the gummatous deposit. It is most common in the nose and pharynx, and, as a rule, ulceration, with the formation of round-celled granulation tissue, has begun before the case has come under observation.

In the nose the gumma usually attacks the septum at the junction of the bony and cartilaginous portions, rarely in the cartilaginous portion alone. It can be distinguished from the non-syphilitic perforating ulcer by the thickened and granular condition of the edges of the perforation Destruction of a greater or less portion of the bony and cartilaginous wall, with casting off of portions of the dead bone, follows after a longer or shorter time. It is frequently accompanied by an abundant formation of foul crusts, and if the case is seen first in the stage of crust formation it may be mistaken for atrophic rhinitis. If the loss of bony and cartilaginous tissue is sufficiently great a saddle-nose may result, but this does not always happen even when there is a great deal of destruction of the central partition, as, in case the side walls are uninjured, saddle-nose is not likely to take place; since, according to Zarniko, this condition is brought about only when the interstitial tissue that binds the cartilage and skin of the nose to the bone is involved in the syphilitic process. Necrosis of the bony framework of the septum, in the absence of a history pointing to phosphorus poisoning or some other irritant chemical, is probably of syphilitic origin.

The diagnosis can only be made after thorough cleansing, removal of all the crusts, and the examination of the area with the probe.

There may be several gummata at different periods and in different portions of the nose. The following case, previously reported by me, illustrates this: A young woman was referred to me by a physician for atrophic rhinitis. He told me he was very sure that syphilis was not a factor in the case. I treated it as a case of atrophic rhinitis without making much headway. There was a perforation in the cartilaginous septum, some necrosis of the edge of the bony septum, and many foul crusts. After a while I began to get away bits of necrosed septal and turbinal bone, and a saddle-nose appeared. I then began antisyphilitic treatment. In the midst of this she became pregnant, was delivered of an apparently healthy baby, and disappeared from observation. Later she returned, when anti-syphilitic treatment was resumed, and I told her the nature of the trouble. She again disappeared from treatment, but returned some time after with a gumma at the margin of each ala, and with the process attacking the skin and cartilage between the two. She stated that she had absented herself because she was angry at my telling her she had syphilis, but the conditions becoming so desperate she had again sought me that the external nose might be saved if possible. The process rapidly subsided under the mixed treatment in large doses, and the external nose and alæ were saved from destruction. In this case valuable time was lost by my allowing an absence of history to stand in the way of a proper diagnosis.

These cases improve very rapidly under treatment, though it is doubtful if bone which has begun to be necrotic can be saved, but untreated the destructive process goes on almost indefinitely. The local conditions should be treated surgically only so far as to remove manifestly dead tissue, as thickenings and granulations will melt away under proper constitutional treatment, and the resulting cicatrizations are less than if all of the granulation tissue which is apparently in the way is removed. There is no use in attempting to remove necrosed bone until complete separation has taken place. No operative procedure should be undertaken in the nose during the presence of the syphilitic process, but should be deferred until it has ceased to be active.

The tertiary manifestations of the pharynx are very troublesome, especially when they occur high up on the pharyngeal wall, as adhesions usually result between the pharynx and the pillars, and the cavity of the pharynx may be completely shut off from that of the nose as a result of the subsequent contractures. The pharyngeal ulcer of this stage is quite characteristic, being irregular in shape, varying in size, presenting a mouse-eaten appearance, with ridges and little hillocks of granulation tissue on its borders. On the soft palate, in the region of the uvula, there may be a complete perforation, through which can be seen certain fibres of muscle which have escaped destruction. In the active stage the ulcer is covered with a gray exudate, and shows no tendency to heal until anti-syphilitic treatment is begun. The tonsils and both sides of the epiglottis are frequently the seat of the gumma. All the laryngeal cartilages may be affected, the symptoms here being those of a perichondritis, occurring as a late and destructive result of the gumma. Life itself may be endangered by the perichondritis. Pain is not a marked symptom, being usually absent, except in the event of perichondritis, and then lasting only until the pus can reach the surface.

The diagnosis must usually be made in the absence of a history, and can be more satisfactorily made through the medium of constitutional treatment than in any other way. I have several times been successful with this plan when it seemed in the individual case as though syphilis could not be present, local and cleansing treatment having been previously tried without avail; while after antisyphilitic treatment improvement has been so rapid and positive that there could no doubt in regard to the diagnosis.

Between the manifestations of syphilis, carcinoma, and tuberculosis, there may at times be some doubt as to the diagnosis. In carcinoma there is manifest pain, which is usually absent in syphilis, the constitutional dyscrasia is very much more marked, while the disease becomes progressively worse. Nevertheless, the diagnosis may at times be very difficult, as in the following case: A woman of fifty was seen by me for a crater-like, indurated ulceration at the side of the base of the tongue, while the right false cord and the ary-epiglottic fold were irregular in outline, thickened, reddened, having all the appearance of an early stage of carcinoma. The diagnosis of carcinoma was confirmed by a competent consultant. Some iodide of potassium was given with the idea that perhaps it might stay the progress of the affection, but without thought that the condition was one of syphilis. There was absolutely no history, and no reason whatever to suspect the presence of the disease. Nevertheless, improvement was rapid under the iodide, which was increased in quantity up to sixty grains three times a day, until all signs of trouble practically disappeared, and the local conditions were nearly normal. Constitutional treatment was kept up more or less of the time for the succeeding two years, and at the present time there is no sign of disease.

In the case of tuberculosis, the presence of cough, the examination of the sputum for tubercle bacilli, and the general constitutional symptoms will usually suffice. Syphilitic disease and tuberculosis of the larynx may sometimes be confounded; but as tuberculous laryngitis usually begins in the arytenoid space, later affecting both cords, and is not improved by constitutional treatment, while the syphilitic manifestations, in my experience at least, usually affect only one side, and by preference either the arytenoid alone or the cord alone, the diagnosis should not long remain in doubt. Syphilis and tuberculosis or syphilis and carcinoma may coexist.

The tertiary manifestations may appear in the naso-pharynx with but little sign of the presence of the disease in the pharynx itself.

Treatment.—Iodide of potassium has been the sheet-anchor for this stage. It has usually been stated that it was to be given in preference to mercury. I have not infrequently given mercury in addition, in the form of the protoiodide, and have found improvement to be much more rapid than when the iodide was taken alone. I have not usually given the iodide in large doses, but only five to ten grains three times a day, though I have at times given as high as 70 to 80 grains, three times a day. The amount of iodide given must depend entirely upon the toleration of the patient; so long as the dose is well borne it can be increased to almost any amount. When symptoms of elimination through the skin appear the dose is to be diminished, but the drug is not to be discontinued.

When the disease is under control the iodide is given one week and the mercurial the next, and later the treatment is intermitted every other month. Treatment should be continued and the patient kept under observation for at least two years. Mercury by inunction can be given if necessary, and I have not infrequently used it in the tertiary stage.

For direct treatment of the ulcerated area, nitrate of silver stick and weak solutions of chromic acid should be applied occasionally, with the daily use of alkaline antiseptic washes.

The healing of all forms of ulcers of the tertiary type may be followed by great contraction of the involved area, with the formation of dense, non-yielding, fibrous bands. The liability of the formation of these should be explained to the patient.

Hereditary Syphilis.—Occurring early in life it is known as "syphilitic rhinitis of children," and "snuffles." The principal manifestations are in the nose, and are those of a coryza of somewhat intense character, with but little tendency to recovery. This must not be confused with the non-syphilitic rhinitis of children, the most frequent cause of which is the presence of adenoids. The probable history of the case will aid in the diagnosis, while the child will very likely be of the strumous type.

The treatment should be constitutional, together with measures for keeping the nose clean. Blowing with the air douche applied to one nostril so as to force the secretion out of the other, or syringing, are the cleansing measures to be employed.

Hereditary syphilis also appears in another form in the upper air tract, known as syphilis congenita tarda, latent syphilis, or occult syphilis. The manifestations of this form appear about the age of puberty, and are due to the formation of the gumma and the subsequent breaking down. Occasionally one will be in doubt whether he has to deal with a late congenital or straight tertiary. In one such case, the characteristic pharyngeal ulcerations and granulations were present, with beginning adhesions to the soft palate and their accompanying contractions. There was an iritis which suggested syphilis, but there was entire absence of any history, yet improvement followed antisyphilitic treatment. In another case of delayed hereditary syphilis, the father's history was uncertain, the mother had a perforated septum and a saddle-nose, while the patient, a girl of seventeen, had a perforated septum, saddle-nose, cicatricial contractions and adhesions to the pharyngeal wall and soft palate to such an extent that there was an opening into the naso-pharynx only large enough to admit a probe. The history was that the throat conditions had been growing worse for several years, having begun to develop around the age of puberty. Improvement was rapid under treatment, but the adhesions and contractures remained.

The question of what can be done for the relief of the deformities which result from syphilitic contractions in the nose and pharynx is one of considerable importance. So far as the external nose is concerned considerable has been done in the way of general surgery by elevating the saddle-nose and putting plates of platinum underneath the skin. The new method of injection of paraffin will probably be of service in this regard. But little has been done in regard to the pharynx. Adhesions, if cut away, have a tendency to reform. The tissue itself is very fibrous, and is not improved by stretching; and after cutting operations the contraction is not infrequently greater than before. The earlier a case can be seen, and the more promptly it can be got under constitutional treatment, the less likelihood there is of permanent destruction and contraction of tissue taking place.

CHAPTER XXIV.

TUBERCULOSIS.

Compared with the number of cases of pulmonary tuberculosis, tuberculosis as it manifests itself in the upper air tract may be said to be uncommon, although the absolute number of cases is considerable. It occurs most often in the larynx, less often in the pharynx and mouth, and least often in the nose. Considering the fact that tubercle bacilli are probably frequently inhaled through the nose or mouth, and that in the cases in which the lung is involved the trachea, larynx and lower pharynx are brought into direct contact with the bacilli in the act of coughing, it would naturally be expected that tuberculosis of the upper air tract would be seen more frequently than it is. This comparative immunity has never been satisfactorily explained; it may possibly be due to the fact that the nasal and buccal secretions apparently have some bactericidal property. Be the explanation as it may, the fact remains.

TUBERCULOSIS OF THE NOSE.

This is the rarest form of tuberculosis of the upper air tract. It appears on the cartilaginous portion of the septum, on one or both sides, and is usually associated with tuberculosis in some other part of the body. It has occurred primarily, but this is very rare. Its cause is usually in doubt; it may possibly be due to the deposition of tubercle bacilli directly from the finger-nail, or the cartilaginous portion of the septum having been eroded by the finger-nail or otherwise, a favorable soil is afforded for the bacillus.

Experiments relative to the bactericidal property of nasal mucus are rather inconclusive, but they seem to show that it has some power in that direction; since pathogenic bacteria are relatively rare in the nose, whereas, on account of its natural relation to the external air, the nose would seem to be the easiest of all tracts to infect. Only a few cases of nasal tuberculosis have come under my immediate observation, one of which was secondary to tuberculosis of the larynx, which in its turn was secondary to tuberculosis of the lungs; while another was presumptively primary, though there had been tuberculous joint trouble. It is probable that it is usually secondary to tuberculosis in some other part.

Symptoms.—There is usually no pain; complaint is made of some swelling of the parts and the formation of crusts, the latter leaving a bleeding surface on their removal; unpleasant odor is absent or slight. On examination a soft, elevated, granular mass, with a broad base, is found to occupy more or less of the cartilaginous portion of the septum. This bleeds easily, is soft to the probe, and if it has lasted any length of time there may be perforation. It is usually stated that perforation is sure to occur, but I do not think that this is invariably the case, since in the several instances which have come under my observation perforation had not taken place. The entire septal area may sooner or later be affected, while the neighboring turbinal structures seldom or never are.

The question of diagnosis is sometimes difficult, as the trouble may easily be confounded with a syphilitic granuloma. The presence of constitutional symptoms or of tuberculosis in some other part will be a help in the diagnosis, as will also the general cachexia of the individual; while treatment with reference to syphilis will often clear up a doubtful case. The tubercular granuloma bleeds more readily than the syphilitic, usually covers a greater area, is as a rule situated farther forward, and has rather less tendency to perforation. The softness of the tumor will differentiate it from sarcoma. Sarcoma is of more rapid growth, and invariably recurs very rapidly unless entirely removed. Tubercle bacilli are not as a rule to be detected, although they are sometimes found. It can be distinguished from lupus by its appearance, and by the fact that lupus is inclined to heal on certain borders and extend on others, leaving a characteristic scar, while the tuberculous granuloma has no tendency to heal.

Treatment.—This consists in the curetting away of the granulomatous material and the application to its base of such caustic remedies as are in general use for tuberculous ulcerations, such as lactic acid, 25 per cent. to 100 per cent.; or ortho-paramonochlorophenol, 5 per cent. to 10 per cent.; chromic acid, and the like. Menthol guaiacol and iodoform are also used as local applications.

Prognosis.—So far as the nose is concerned, it can be considered to be good; but as nasal tuberculosis is usually only a part of a constitutional cachexia, the prognosis must depend a good deal upon the general condition of the patient.

TUBERCULOSIS OF THE PHARYNX.

In the pharynx tuberculosis is usually secondary, though the possibility of its being primary must be admitted. It begins in the form of small miliary tubercles, which infiltrate the affected area and gradually coalesce, break down, and form shallow ulcers. This may also occur in the soft palate and on the uvula, on the posterior pharyngeal wall, and in the tonsillar area adjacent to or between the pharyngeal pillars, in which latter region occur the most troublesome cases. In appearance the pharynx is usually anemic, while the small miliary tubercles appear as minute shining points scattered here and there over the affected area. It will sometimes, perhaps usually, happen that as this condition does not produce pain or special symptoms, the physician's attention will not be called to it until ulceration has taken place, and complaint is made of difficult painful swallowing and soreness of the muscles of the neck.

The ulceration is almost always superficial, has a shallow, crater-like appearance, with somewhat jagged edges and a speckled surface, granular on the border and fading away into the sound tissue.

It will seldom happen that syphilis will be a factor of doubt in the diagnosis, as the syphilitic lesions of the pharynx grow rapidly better under constitutional treatment, and on healing leave cicatricial contractures; while the tuberculous ulcers shows no tendency to heal except after cauterization or removal.

Bacilli will probably be detected but rarely, either because they are destroyed or are washed away by the secretions of the mouth, so that they are not present in the specimen examined.

If the tongue is affected it will be very sensitive, and the tip, sides and base will be the parts involved.

In the tonsil there are but few symptoms in the beginning, as the tuberculous deposit localizes itself in the lacunæ and is often overlooked on examination.

Tuberculosis of the pharynx is more common in men than in women, in about the proportion of one to four.

Symptoms are those of pain and difficulty in swallowing. The pain may radiate up to the ear, and may be out of all proportion to the extent of ulcerated area visible on inspection. There is difficulty in swallowing either solid or liquid food. Food will occasionally be refused, and death from starvation occur, the patient utterly refusing to take it on account of the pain. In one of my cases of pharyngeal tuberculosis, the localization was between the pillars and along the line of the posterior pillar, the overlying tonsil on the same side also being affected. The other side was also complained of, but no active ulceration could be found. In this case treatment was by means of caustic applications, such as the galvano-cautery, lactic acid and the phenols, in the attempt to completely destroy the ulcerated area. Healing would take place; a period of three or four months would elapse, during which time it would seem as though healing had ensued; breaking down would again occur, and the process of treatment would be repeated; until finally death from starvation took place, the pain and difficulty of swallowing becoming so extreme that the patient refused nourishment. In this instance there was no laryngeal tuberculosis, but a history of the involvement of one lung two or three years previously, which had apparently healed. The infection probably came from this source, and presumably by way of the lymphatic tract.

Prognosis is grave; sooner or later the patient will probably succumb to the disease.

Treatment.—This consists in the destruction of all the diseased area down to sound tissue, followed by such soothing applications as afford the most relief. In the later stages the severer applications will have to be abandoned, and the surface sprayed with cocaine, orthoform or menthol. All measures used must be such as contribute to the comfort of the patient and render swallowing as little painful as it can be made. Morphia hypodermically will probably be necessary sooner or later, but is not to be employed until absolutely demanded.

Such constitutional measures should be employed as seem to be indicated in the individual case.

TUBERCULOSIS OF THE LARYNX.

This is by far the most common of the tuberculous affections of the upper air tract, and occurs in quite a considerable proportion of the cases of tuberculosis of the lung—according to Rosenberg, in about thirty per cent. of the cases. This proportion seems to me rather high. J. Solis-Cohen reports it as from five to ten per cent. It is most common in young people between the ages of eighteen and thirty-five, and is usually secondary to or coexistent with tuberculosis of the lung.

It has been a much discussed point whether tuberculosis of the larynx is ever primary. There seems to be sufficient evidence to show that it occasionally appears as a distinctly primary lesion, unaccompanied with pulmonary tuberculosis, or else the latter has healed and is not demonstrable at the time of the laryngeal lesion. One such case of apparently primary laryngeal tuberculosis has come under my own observation. In the main, however, and in probably ninety-five per cent. or more of the cases, it coexists with, or is secondary to, tuberculosis of the lung. Considering the fact that in pulmonary tuberculosis the laryngeal surfaces are constantly irritated by the presence of the cough, the secretions from which are brought into direct contact with them, and that the mucous membrane must be more or less abraded from the same cause, it is strange that the larynx is not more frequently invaded by the disease instead of being so often immune.

The infection occurs in two ways, either directly through abrasions or indirectly through the lymph channels. In most instances the affection of the larynx is preceded by an ordinary acute or chronic catarrh, which probably acts as a predisposing factor.

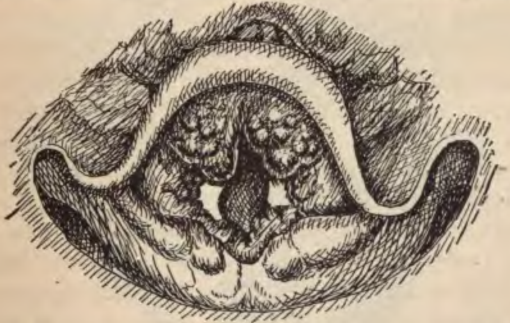

FIG. 70. Later stage of the granular ulcerative form of laryngeal tuberculosis. The false cords and the inter-arytenoid space is the seat of the granuloma. Only a portion of the true cords is visible. How much they also are affected can not be seen. The voice is hoarse and there is dyspnea. The patient is a woman 30 years old, complaining of hoarseness for three years. The lung is affected. (From Grünwald.)

Constitutional syphilis is said to favor the tuberculous invasion of the larynx. Males are more often affected than females. Tubercle bacilli are not always present, that is, are not always demonstrable in the laryngeal secretions, but where pulmonary tuberculosis is present can usually be found in the sputum.

The disease is an inflammatory process in the larynx, and occurs in two forms, which have been more or less subdivided. These different subdivisions can all be referred to two classes, being merely different stages of the disease. The first form is that of a granular or nodular formation of new tissue, increasing in amount, and usually slowly and gradually going on to ulceration and destruction, with loss of voice, difficulty in swallowing, invasion of all the laryngeal structures, exhaustion and death. (See Fig. 70.) The second form manifests itself as a diffuse infiltration, beginning as a submucous infiltration of some portion of the larynx, such as the epiglottis, arytenoids or ary-epiglottic folds, with gradual extension, swelling, hoarseness, difficult breathing, and later breaking down with ulceration, the final condition being much the same as in the first form. (See Fig. 71.) Of the portions affected, the arytenoids, posterior laryngeal wall, ary-epiglottic folds, epiglottis, false and true cords, and the rest of the laryngeal structures are involved in about the order named.

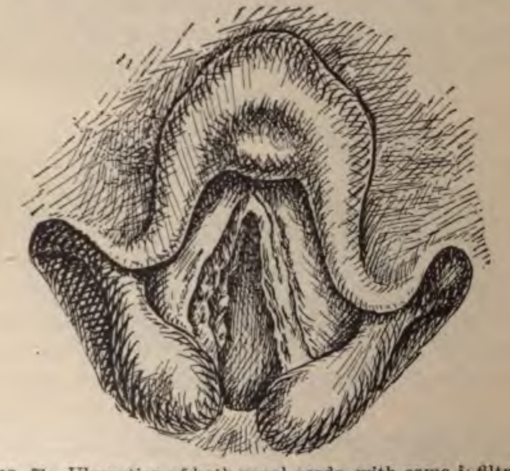

FIG. 71. Ulceration of both vocal cords, with some infiltration of both arytenoids. Patient is 36 years old, complaining of loss of voice for six months. Lungs are probably tuberculous. (From Grünwald.)

Symptoms.—The first symptoms in either form are those of an ordinary laryngeal catarrh, followed later either by infiltration or by slight ulceration, subnormal temperature with slight evening elevation, and general languor and debility. The ulcerative variety usually begins with the formation of small cauliflower elevations in the arytenoid space. These are easily distinguished by the fact that they do not disappear when the larynx is widely open as do the natural rugae of the inter-arytenoid space. These cauliflower elevations increase in number, spread along one or both cords, true or false or both, and form thickenings, erosions, and ulcerations. The symptoms are those of increased hoarseness and cough, until complete aphonia takes place. The diseased surfaces are bathed with mucous secretion which is of itself a great annoyance. With the further onset of the disease, more and more laryngeal tissue becomes involved, certain areas break down, and ulcerations form. The epiglottis may be invaded as well as the laryngeal cartilages. There is difficult swallowing and considerable pain.

The infiltrative form usually begins in one or both arytenoids and the ary-epiglottic folds; these lose their natural appearance, looking like rounded, coppery-red, swollen hillocks. The movements of the epiglottis become limited, and the cords disappear from view behind the swollen false cords. The epiglottis itself is frequently very much involved, becoming swollen and changed in outline; it may even be ulcerated away in part with an irregular bleeding surface. Paralysis of the cords themselves may occur, and the amount and character of the secretion, degree of hoarseness, aphonia and difficult deglutition be about the same as in the ulcerative form; later here also ulceration takes place. Different portions of the larynx may show both forms at the same time. (See Fig. 72 and Fig. 73.)

A true perichondritis of the laryngeal cartilages may also set in, accompanied by abscess formation and necrosis. Cases of laryngeal tuberculosis will seek the physician's aid at all of the stages mentioned.

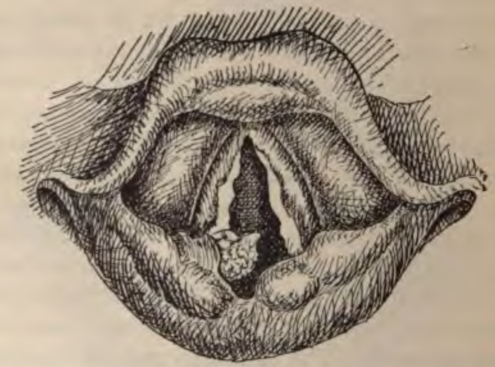

FIG. 72. Tubercular granuloma, projecting into lumen of larynx from base of right true cord. There is erosion and ulceration of each cord, with some infiltration of the right arytenoid. The patient, a woman of twenty-five, complains of total loss of voice and a "little cough." The lungs are tuberculous. (From Grünwald.)

The degree of pain on swallowing will depend somewhat on the part of the larynx involved. Pain will be greatest when the posterior portions are the seat of the disease. Cough, as a rule, is more marked than pain. Dyspnea is present in advanced cases only.

Diagnosis.—In the presence of manifest lung involvement the diagnosis is usually sufficiently easy, but in an early stage it may be difficult. The disease must be differentiated from a simple laryngeal catarrh, acute or chronic, and from syphilis and carcinoma. In the early stages it may be perplexing to distinguish it from syphilis or carcinoma. The histological examination is an important aid, and tubercle bacilli should be sought for, although they will frequently be absent unless the lung involvement be positive; while the course of the disease and the constitutional conditions will be important factors. In case of doubt between tuberculosis and syphilis the result of specific treatment is of the greatest diagnostic value.

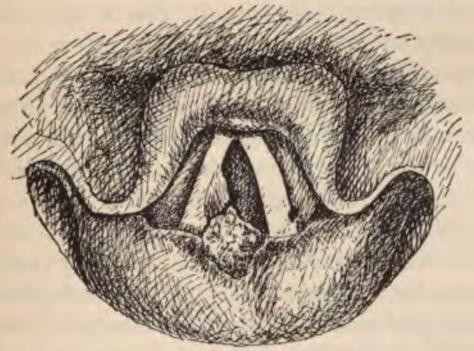

FIG. 73. Tubercular infiltration and swelling of both arytenoids, with granulation tumor in inter-arytenoid space and a tubercular swelling at middle of right cord, projecting into lumen of larynx. The patient is a woman of 47, with tubercular lungs, short of breath, and totally aphonic. (From Grünwald.)

From the laryngeal manifestations alone the diagnosis may be difficult, especially in the hands of unskilled observers. In no class of laryngeal affections is the natural irritability of the pharynx and larynx so extreme, and the difficulty in the matter of technique in the obtaining of a satisfactory examination so great. Retching and gagging almost always take place when an attempt at examination is made. The administration of remedies *via* the larynx, and all intra-laryngeal surgical procedures, offer great difficulties even in the hands of the trained laryngologist, while to the physician doing only a small amount of laryngeal work they are well nigh impossible. An examination sufficiently accurate for purposes of diagnosis may usually be obtained by spraying the back of the pharynx and the entrance to the larynx with four per cent. cocaine. Even then vomiting and retching are frequently not controlled. The administration hypodermically of from one-eighth to one-quarter grain of morphia about half an hour before the examination very much lessens the laryngeal irritability.

Prognosis.—In an early stage of the non-infiltrative form, accompanied with only slight pulmonary involvement, the diseased area may be removed, and a cure or prolongation of life be effected. In the infiltrative form the prognosis is always bad.

Treatment.—This will depend entirely upon the stage in which the case is seen, whether it is of the ulcerative or infiltrative variety, on the degree of intra-laryngeal technique at the command of the physician, and on the tolerance of the patient. In the infiltrative form but little can be done except by the use of such measures as tend to improve the constitutional condition and thereby retard the onward progress of the disease. The constitutional treatment is that of the disease in general, and need not be detailed here. Sprays of cocain, 2 to 4 per cent. solution, to which can be added adrenalin chloride, so as to make 1-10,000 solution, afford some relief. The following formulæ may be used as insufflations:

℞ Orthoform powder,
℞ Morphin........................3%
Iodoform.......................97%

℞	Morphin sulph.	1-30 gr.
	Calomel	20 gr.
	Sugar of milk	40 gr.
	Bismuth subnit.	40 gr.

The insufflations are to be made with a powder blower during inspiration if possible, and the patient instructed not to cough immediately afterwards. Some self-control is necessary or a paroxysm of coughing will be set up and the greater portion of the powder expelled.

In the ulcerative form, with the formation of granulation tissue and the cauliflower excrescences, local treatment does a great deal of good. The cutting curettes of Schrötter, Krause and Heryng, when used by a skilled laryngologist, enable one to cut away the greater portion of the excrescences and sometimes to remove all of the disease. Much skill and technique are required in their use. The larynx should be anesthetized with four per cent. and then with twenty per cent. cocaine. One-quarter grain of morphia hypodermically should be given in advance. The instruments must be used under perfect illumination, and great care should be taken not to remove sound tissue. For the exact technique and for illustration of the various instruments employed, the reader is referred to the larger text-books on laryngology. After removal of tuberculous material in this way, the surface from which it has been removed is scraped with the actual curette, or rubbed with caustic applications of lactic acid, orthomonochlorophenol, paramonochlorophenol, chromic acid or nitrate of silver.

In the absence of cutting forceps or the curette I have found the following procedure to work very satisfactorily, and its technique is not nearly so difficult. It can readily be used by the ordinary practitioner who has fair laryngeal skill and is able to see just where he is making an application. Lactic acid seems to have a considerable degree of value in the destruction of tuberculous granulations, and at the same time does not appear to injure sound tissue or to act upon the unabraded mucous membrane; while paramonochlorophenol, one of the carbolic series, also has some value for the same purpose. For several years I have been in the habit of using both of these for local application, sometimes after removing the granulations with the laryngeal forceps or the curette, and frequently without previous intra-laryngeal instrumentation. The technique is as follows: A right-angled laryngeal applicator, wound with cotton so tightly that it cannot possibly come off, is the only instrument required. The larynx and pharynx are both sprayed with four per cent. cocaine. The applicator is then dipped into twenty per cent. cocaine solution, and, under the guidance of the mirror, carried down into the larynx as far as may be necessary, touching the diseased spots. The reversed image and the depth of the larynx are here puzzling factors ; and as these patients gag very readily, and frequently vomit, all applications have to be made very rapidly. As soon as the larynx is anesthetized the tip of the applicator is put into the lactic acid solution, and carried down and rubbed into the affected area, which is usually the inter-arytenoid space or the edges of the true or false cords. This is followed by an application of the phenol, which, on account of its limited power of solubility in water, must be dissolved in a solution of equal parts of glycerine and water. I begin with a twenty-five per cent. solution of lactic acid, followed by a four per cent. solution of paramonochlorophenol, gradually increasing the strength of both solutions until I use the lactic acid pure and the phenol ten per cent. If the larynx is sufficiently well cocainized the amount of pain resulting from each application is comparatively slight and of short duration. After treatment the area has a whitish appearance, which passes off in a day or so. If possible the applications should be made twice a week. Care must be taken not to get the cotton swab either too thick or too wet with the solution; otherwise severe laryngeal coughing and spasm may be set up. What is desired is, to rub a little of the caustic application into the diseased tissue, and not to drop it into the trachea. In the early stages I have frequently seen the most marked benefit from this procedure. In a few instances almost complete restoration of voice has taken place, and the other symptoms have been markedly improved. In others the progress of the disease seemed to be stayed, and in one or two cases an apparent cure resulted.

If the case is seen in the later stages of the disease, with considerable infiltration or ulceration or both and great limitation of motion, with the patient complaining mostly of hoarseness and but slightly of pain, when there is manifest impossibility of doing more than somewhat relieving the condition, I do not regard local applications as likely to afford sufficient relief to justify the discomfort which they produce; nor do I think that in these cases the intra-laryngeal removal of tissue offers much hope. In this stage the treatment must depend upon local soothing applications of the class just mentioned in connection with the infiltrative variety, and of such general treatment as will be best suited to the individual case. Direct intra-tracheal injection of guaiacol, menthol, and orthoform, as in the following formulæ, frequently afford relief and possibly retard the progress of the disease.

℞	Menthol	2.0 to 10.0	30 to 150 gr.
	Ol. amygdal. dulc.	30.0	℥ i.
	Vitelli ovi	25.0	ʒ vi.
	Orthoform	12.5	ʒ iii.
	Aqua destill. q.s. ad.	100.0	℥ iii.

Ft. Emulsion; shake well; apply locally.

Can be used on swab or in the intra-tracheal syringe, preferably the latter.

This is known as the Freudenthal emulsion, and has been used by its originator and others with good results. The anesthetic effect of a single application will last for hours.

Camphor	
Menthol	
Guiacol	aa 48 grs.
Olive oil q. s. ad	2 oz.

This formula is used with an intra-tracheal syringe during inhalation.

A large number of formulæ for sprays, pigments and insufflations have been published, the very number of which is suggestive of the almost hopeless character of the disease.

Much apparatus for the inhalation of various nebulæ has been invented. These vapors are somewhat soothing to the patient, but have not in my experience seemed to be in any way curative or to have any power to retard the progress of the disease.

CHAPTER XXV.

NEW-GROWTHS—BENIGN.

The principal benign growths in the nose and naso-pharynx are mucous polypi, fibromata, a few papillomata, the latter growing from the septum or turbinate, and the angiomata, or bleeding polypi; the treatment of these latter has already been considered.

In the pharynx cysts and papillomata occasionally occur, although they are comparatively rare. Adenomata grow at times in the naso-pharynx and sometimes in the pharynx; these, however, while sometimes benign are more often of the nature and character of malignant growths.

Several forms of benign growths appear in the larynx, the most frequent of which are papillomata; fibromata come next often; and angiomata, adenomata and lipomata occasionally occur.

The papillomata are found in very young children and in adults, and the symptoms and appearances are somewhat different, according as they appear early or later in life. These neoplasms may appear in young children from the time of birth up to four or five or more years of age; and while properly speaking they are benign growths, they may, owing to their mechanical hindrance to respiration, take on some of the characteristics of a malignant growth and threaten the life of the child. The symptoms are aphonia, with a croupy cough, and dyspnea. They grow with considerable rapidity, frequently filling up nearly the entire larynx, and tend to recur in three or four months after removal. They are outgrowths from the vocal cords, usually coming from the anterior third or one-half of one or both cords, and are formed of papillary proliferations from the mucous membrane, being a sort of local redundance of normal tissue.

Papillomata are usually sessile with a broad base, but may have a long pedicle. They may come from the ventricles, the subglottic space or the anterior commissure. In appearance they are pinkish-white or grayish-white as to color, of varying size, and have a warty or cauliflower appearance when viewed in the laryngoscopic mirror. Rarely they will also appear as reddish tumors, resembling a mulberry. They may be so numerous as to occupy nearly all the glottic space and obscure a view of the cords (see Fig. 74). They are fortunately quite rare. Owing to the difficulties of laryngoscopic examination in young children, the diagnosis must as a rule depend upon the aphonia and dyspnea, which steadily increase in extent, being pretty constant and having no relationship to the ordinary causes of aphonia, such as colds or local inflammations. When a laryngoscopic examination can be made the diagnosis presents few difficulties.

The treatment consists of removal through the larynx by means of snare and cutting forceps; by the use of caustic applications, as silver nitrate, chromic acid and the like; by the application of pure alcohol; or by external surgery, such as thyrotomy. Under all of these methods of treatment recurrences are likely to take place, though permanent cures are occasionally effected.

Owing to the extreme dyspnea tracheotomy will not infrequently be necessary, and, curiously enough, tracheotomy itself sometimes causes a cure of these growths, owing to the cessation of any laryngeal irritation; so that, after a longer or shorter time, they may disappear of themselves, and later the tracheotomy tube can be removed.

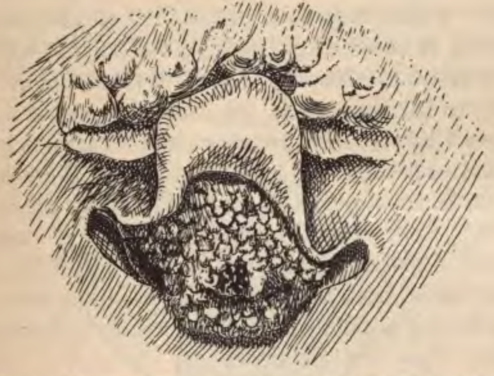

FIG. 74. (Larygeal papilloma in a child.) Patient a 3½ year-old boy, with total loss of voice and urgent dyspnea. Inspiration was difficult, prolonged and noisily stridulous ; expiration was lighter. He was cyanotic in appearance. Condition developed in the second year after whooping cough.

In the mirror the entire entrance to the larynx appears covered with a mulberry like tumor of bright red color, which can be felt under the finger as of soft consistence and slight mobility. (From Grünwald.)

In the class of papillomatous cases occurring in adults the tumors usually appear as smaller sessile or pedunculated growths of from the size of a mustard seed to that of a walnut, on one cord only, though occasionally on both, and usually on the anterior or middle third of the cord (see Fig. 75). They sometimes, though more rarely, occur on the vocal bands, ary-epiglottic folds or epiglottis, in the latter place producing dysphagia, if of any considerable size. They are more common in the early and middle periods of life, and among those who use the voice a good deal; are found more frequently in men than in women; and are probably the result of voice irritation accompanied with frequent colds, whereby the mucous membrane becomes irritated, relaxed, thickened in one spot, followed by an outgrowth, which later projects into the lumen of the larynx.

These tumors are seldom painful, and produce discomfort on account of the hoarseness or aphonia they cause. There may be a cough, dry or hacking, and a feeling as of a foreign body in the larynx, with frequent desire to clear the throat. Dyspnea is not present up to the time when the larynx ceases to accommodate itself to the growing tumor, after which it appears, and it is especially marked if there be any local inflammation which of itself tends to narrow the glottis. They may be sessile, in which case the aphonia is greater than when they are pedunculated. In the latter case, they are either above or below the cords during phonation, and the resulting hoarseness is less. They rarely bleed.

The diagnosis can only be made with certainty by laryngoscopic examination. The question of diagnosis between a papilloma and an early stage of carcinoma may come up, and here the microscopic examination may be of the greatest importance. In general it may be stated that under the age of twenty-five a papillary tumor of the larynx is probably benign. After that age the microscope, medicinal treatment and careful observation may occasionally be required to make the diagnosis certain.

The treatment consists in the removal of the growth with some form of tube forceps or snare, or the right-angled forceps of the Mackenzie type. If possible, the forceps used should be guarded ones, so that there can be no injury to other tissues. If the growths are small, they will frequently shrink away under the application of nitrate of silver or chromic acid. The nitrate of silver can be fused in a small cup and applied through the Shrötter or Krause tube forceps. The chromic acid can be rubbed into one side of a small, tightly-wound laryngeal cotton applicator, so that there need be no danger of hitting any of the tissue of the opposite side. The forcible rubbing of the pedunculated tumor with a cotton-wound applicator will sometimes dislodge it. The use of instruments should be attempted only by one

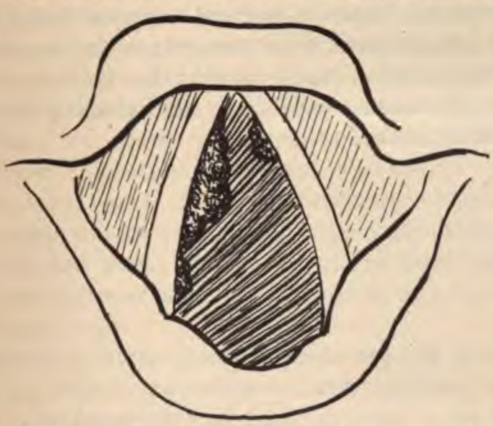

FIG. 75. Benign papillomata in the adult, growing from the edge of the cord, representing three positions. The substance of the cord itself is not invaded. When these papillomata lie far forward they may be easily overlooked, as the epiglottis obscures the view.

considerably skilled in laryngeal manipulation. Preliminary to any operative measure, the larynx should be thoroughly cocainized with twenty per cent. cocaine, and one-quarter grain of morphia should be given hypodermically at least half an hour before doing anything in the larynx. Attempts at removal should not be persisted in for any length of time, especially if the larynx be at all irritable. Under skillful manipulation most of the benign growths can be entirely removed intra-laryngeally. After removal the voice should be rested for several days. After partial removal what remains will frequently gradually disappear.

Besides the papillomata, fibromata occasionally occur in the larynx, though less frequently. They are more apt to be on the laryngeal surface of the epiglottis. Angiomata are also occasionally found. The other forms of new-growth are very rare. It is probable that all forms of benign laryngeal tumors are much less frequent than formerly, owing to the fact that help is more readily sought for aphonic conditions, and because pathologic conditions in the nose are earlier looked after.

CHAPTER XXVI.

NEW-GROWTHS—MALIGNANT.

GENERAL CONSIDERATIONS.

Of these there are two great classes—the sarcomata and the carcinomata. To these can be added certain of the adenomata, which take on clinically at times the characteristics of the sarcomata. Sarcomata occur at a much younger age than carcinomata, are of more rapid growth, form larger, smoother, more lobulated tumors than carcinomata, and have greater tendency to attack bone; while histologically the two forms of neoplasm present well-known differences, into which it is not necessary to go here. Sarcomata are quite as malignant as any other new-growths, are much less limited in the area involved than carcinomata, and there is seldom any apparent etiologic factor.

Adenoma, when of a malignant type, is a harder form of tumor than sarcoma, and appears in the nose, naso-pharynx and pharynx, but in its clinical course does not differ essentially from true sarcoma of the same region.

Carcinoma, whenever and wherever appearing in the upper air-tract, presents the appearance of a red elevated growth, with a rounded, irregular border, usually ulcerating at its centre or some part of the area, with an irregular, nodular floor, covered with foul secretion, readily bleeding, and accompanied by pain, swollen glands, and deterioration of the general health. It attacks by preference the soft parts. Irritations seem to play an important part in the etiology. It is more common in the middle and lower pharynx than sarcoma. All malignant growths are more common in men than in women.

SARCOMATA.

The most common form of malignant new-growth in the nose is the sarcomatous, and of this the principal type is the round-celled, although the spindle-celled also occur. The spindle-celled form is less malignant than the round-celled.

Primary sarcoma of the ethmoid is not infrequently seen in childhood. When it occurs it is of rapid growth and almost invariably fatal, since the absolute removal of the entire tumor is usually impossible. It is generally one-sided, and the first symptom is a unilateral nasal obstruction, with a watery or mucopurulent discharge. Disturbance of vision, with photophobia, is apt to be an accompaniment. The general health becomes affected, and pain, loss of appetite, restless nights, bad odor, and progressive extension of the disease, with deformity, rapidly follow. The growth is friable and bleeds easily. On inspection of the nose in an early stage the growth may appear like a nasal polyp, though usually darker in color. It may extend in several directions. Two such cases have come under my observation. One was in a young child, in whom the growth started near the junction of the soft and hard palates and rapidly invaded the tissues above, extending to the ethmoid cells and the entire upper jaw, followed in two or three months by exhaustion and death. The other was in a child of four, and began with apparently simple benign mucous polypi of the ethmoid cells and sphenoid sinus on the right side. These polypi filled the nose and naso-pharynx, and were most thoroughly removed under chloroform on five occasions, recurring so as to be visible in from four to six weeks. Examined pathologically after the first three operations, they were reported as simple mucous polypi; but the rapid recurrences and the later involvement of the antrum, the orbit and the frontal sinus, either disproved this diagnosis or proved the much-disputed point concerning the possibility of the transformation of benign into malignant growths; for in the latter stages the case was clinically one of sarcoma, and death from exhaustion took place about nine months after the first signs of trouble in the nose. The photograph of this case showing the extensive involvement of one-half of the face is shown herewith (see Fig 76). So far as the external signs are concerned, the entire history, from the time of any visible involvement of the external face, covered less than three months. Whether degeneration of benign polypi into sarcomata occurs or not, is a question not as yet definitely settled. Wright says it is impossible to deny that such transformation does take place, but thinks that many cases so reported are probably sarcomatous from the first. My own opinion is that such was the fact in the case here illustrated.

Two similar cases of ethmoidal sarcoma in adults have also come under my observation, in both of which death occurred from exhaustion. In one of these the eye was removed, but it was only a few days before the space was as completely filled as though no eye had ever been there.

Dr. Charles W. Richardson has reported a fatal case of myxo-sarcoma in a child of five, in which there were repeated recurrences within from four to six days after the apparently complete removal of the growth in the nasal cavity, showing that at times these sarcomata of the nose grow with amazing rapidity.

So far as treatment of ethmoidal sarcoma is concerned, up to the present time we seem to be positively helpless, and can do nothing more than watch the process. Toxins are being tried, but as yet without effect.

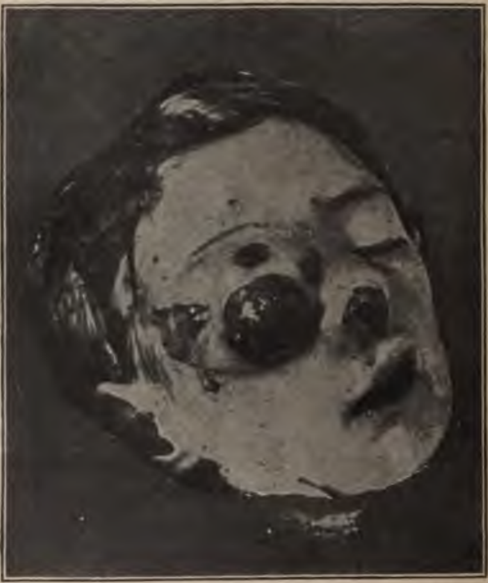

FIG. 76. Late stage of sarcoma of the ethmoid in a female child of 4½ years. Began as a case of apparently simple mucous polypi of the right nostril. Duration, nine months.

Sarcoma sometimes, though rarely, invades the naso-pharynx. Here the diagnosis between an adenoma, an adeno-fibroma or a sarcoma, is sometimes in doubt. While death in a comparatively short time is the usual result, a few cases have been reported in which cure resulted after removal of the growth piecemeal. Recurrence does not follow so quickly as in those cases of sarcoma affecting the ethmoid region. Rice has reported a cure from the injection hypodermically of a compound the base of which was creosote.

Sarcoma also affects the tonsil, the result ultimately being death, as it is an absolute impossibility to remove all of the material and sufficient tissue around it to provide for the life or comfort of the individual. The process is relatively rapid. Booth has reported a case in which death occurred in ten weeks after the first observation of the growth.

In the larynx sarcoma seems to be uncommon, carcinoma being the principal malignant growth to affect the larynx

CARCINOMATA.

In the nose carcinoma is less common than sarcoma; is less rapid in growth; affects principally the septum, though it may attack the turbinates; and can sometimes be entirely removed if removal is undertaken early. It is as a rule rather more sharply defined in area than sarcoma. It does not affect young people. Only one case of primary carcinoma of the nose has come under my own observation. This was one of primary involvement of the inferior turbinate, afterwards extending to the neighboring area, death ensuing from exhaustion.

Primary cancer of the naso-pharynx is almost unknown. Cancer of the tonsil is occasionally seen; while cancer of the pharynx and palate walls comes at times under the observation of every practitioner. It is seldom that such a case is seen sufficiently early to allow of any hope of its complete removal; and one feels most hopeless, as though in the presence of a grim destroyer, when he mentally makes a diagnosis of malignant disease of the pharynx.

Radical surgery up to the present day has seemed only to hasten the death of these patients; in the language of one writer, it can be considered only a favorable outcome if in seeking the aid of operative surgery the afflicted one dies on the operating table. Radical surgery, when extirpation is complete, leaves behind it a probably paralyzed tongue, great difficulty in swallowing, altered or destroyed speech, and the almost certainty of a rapid return. Such patients should have the truth withheld from them as long as possible, and when the time comes that this can no longer be done opiates should be given to the point of euthanasia. In the later stages ulceration takes place, the tissue breaks down, there is a fetid odor, and the condition is deplorable in the extreme.

The diagnosis is usually sufficiently easy to make by inspection or by feeling with the finger. Carcinoma of the pharynx and tonsillar region is accompanied by involvement of all the neighboring glands, and by a tenderness of all the tissues, so that by palpation alone one could almost be sure of the diagnosis. The disease steadily progresses, affecting the palate and bony tissues of the nose and accessory sinuses, or advancing downward toward the larynx and esophagus, until the vital forces no longer resist, and death takes place from exhaustion.

CARCINOMA OF THE LARYNX.

"Fully developed laryngeal cancer is a neoplasm, variable in size, single or multiple, whose surface is bathed in a purulent secretion or sanguineous muco-pus, and whose surface is in a state of fungous ulceration.

"A considerable, irregular, undefined swelling of dirty gray or bright red color on one of the ventricular bands in a patient past the middle period of life, and excluding tuberculosis and lues, should raise grave suspicion of malignant disease." (Morel Mackenzie.)

Carcinoma here, as in the pharynx, appears more often in men than in women, in the proportion of about five to one. Its etiology is usually obscure. Laryngeal irritations and excessive use of the voice are probably provocative factors, though a general carcinomatous idiosyncrasy has perhaps more to do with it. The seat is usually above or below or on the vocal cords, usually, though not necessarily, beginning on the anterior third, at first involving the substance of the cord, slowly invading the whole area, affecting the cartilages, and producing a perichondritis, with breaking down. When the epiglottis is affected, it is usually secondary to cancer of the larynx or pharynx. As the disease progresses there is first aphonia, then dyspnea, dysphagia and pain. Death occurs from starvation, exhaustion, or from suffocative pneumonia, rather than from dyspnea. The disease is usually much more extensive than is evident on laryngoscopic examination.

The diagnosis is sometimes in doubt, as in its early manifestations the laryngeal picture is by no means always certain as to its diagnostic import and may be suggestive of syphilis or of tuberculosis. In all cases the trial of antisyphilitic remedies should be made for a couple of weeks before an absolute diagnosis of carcinoma is made. In this connection it must be borne in mind that iodide of potassium frequently causes retardation of a malignant growth for a time, and also that syphilis and carcinoma can coexist. I have already mentioned a case in which a provisional diagnosis of carcinoma had been made, yet which proved to be a case of syphilis. Schmidt has reported a case in which removal of the larynx was advised, yet which recovered after three weeks' use of iodide of potassium. As a rule, however, the cauliflower-like, readily bleeding, peculiar appearing, granulomatous carcinomatous mass is so well marked that the diagnosis as made by laryngoscopic examination is sufficiently clear (see Fig. 77). Bleeding is frequent, and while usually scanty may be profuse. It is now and then one of the first signs to which the patient's attention is called. Hoarseness and bleeding was all that the patient complained of in one of my cases. The glands of the external neck may not be swollen until very late in the disease.

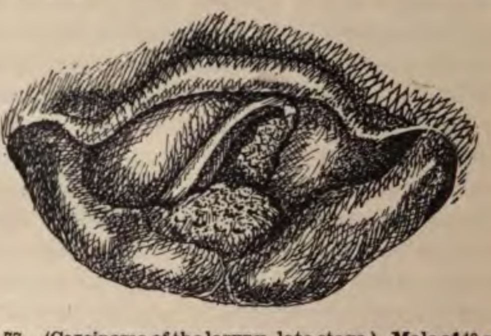

FIG 77. (Carcinoma of the larynx, late stage.) Male of 49 years, with difficult breathing for several months; able to swallow liquids only. Sought assistance for threatened suffocation.

Left vocal cord transformed into two carcinomatous masses, one occupying the middle and anterior third of the cord, and the other the posterior one-third and inter-arytenoid space. The glands of the neck are not swollen. Underneath the right cord the tissue is red, suggestive of the beginning of the same process here. (From Grünwald.)

It is usually possible to remove a portion of the disease sufficiently large for microscopic examination; but owing to the danger of further infection many writers have protested against such removal, thinking that a diagnosis sufficiently accurate can in most cases be made by naked eye inspection, the clinical symptoms and the results of antisyphilitic treatment. Even the diagnosis from microscopic examination is not always accurate, and when negative is by no means conclusive.

The duration of the disease is a very variable one, being from a few months to a few years. Perhaps an average of eighteen months to two years is fairly accurate.

Being more sharply limited, not accompanied by so much lymphatic involvement, and visible comparatively early to the *naked eye*, carcinoma of the larynx has seemed to offer a better field for removal than carcinoma of the pharynx or tonsillar regions. Numerous attempts have been made to remove small areas of cancer of the larynx by intra-laryngeal operation, and when done sufficiently early this has sometimes been successful. This is possible only at a very early stage, when the growth is sharply limited and without infiltrating cancer cells, and only then in the hands of a most skilled laryngologist. It is not at all practicable for the average practitioner, even when possessed of a considerable amount of skill in laryngeal technique. Operations through the mouth when unsuccessful seem to be followed by rapid increase in the rate of growth. When the growth has lasted for any length of time, it is, as already stated, much greater in extent than is apparent on laryngoscopic examination.

Two courses of treatment seem to be all that are available: First, thyrotomy; that is, the splitting of the thyroid cartilage externally and the removal of the growth, and the suturing of the thyroid together again. The operator doing this must always be prepared for a more extensive operation than he had anticipated, even to the removal of half of the thyroid if the growth be limited to one-half, or to the removal of the entire larynx, or complete laryngectomy, provided the growth extends to both sides. Incomplete removal is always followed by rapid return of the growth, more extensive in area than before; so tha a thyrotomy may lead to a laryngectomy, and laryngectomy is one of the most serious operations in surgery, is difficult in technique, and should only be done by the skillful surgeon. This operation carries with it the dangers of pneumonia, of injuries to the pneumogastric nerves or to the esophagus, and of general septicemia. Even with a successful operation, the patient is minus a larynx, and has the risk of recurrence always before him. Of the number of operative cases comparatively few have lived more than a few weeks; in most instances life has been shortened by the operation.

No less an authority than J. N. Mackenzie has urged that early and complete extirpation of the larynx, with its tributary lymphatics and glands, whether they appear diseased or not, be done in all cases of laryngeal cancer, thinking that with improved technique and earlier operation the mortality may perhaps be lessened. Some of the cases operated upon have lived for several years; for instance, the famous Cohen case. Of the cases recorded, six per cent. have lived longer than three years. I have seen one that lived for several years and was able to talk in a whisper by taking air into the mouth and throwing it out in speech, so that a fairly good whisper could be made. Elliot has recently reported a case of successful removal of the larynx in a patient who had been more or less under observation for ten years, and from whose larynx benign papillomata were several times removed. One and a half years ago there was again recurrence, at which time the microscope showed cancer. Thyrotomy was first done with apparent success, but the growth recurred, and the entire larynx with the exception of a part of the cricoid was then removed. This patient has an opening where the larynx formerly was, and by forcing air from the trachea into the mouth can make herself heard by loud whispering. Two successful cases of thyrotomy have been done by him, and he regards the chance of permanent cure of cancer of the vocal cord as good if the larynx is opened and the cord excised in the early stages.

The details of the external operations for both benign and malignant growths of the larynx can be found in the works on general surgery.

In all cases of laryngeal carcinoma which are operated upon, tracheotomy must be done at or preceding the time of operation; and also in the large class of cases which are inoperable, but which demand relief from the urgent dyspnea, tracheotomy is to be resorted to as a means of prolonging life and increasing the comfort of the individual. Fairly endurable existence for many months not infrequently follows this operation. Tracheotomy should be done as low down as possible as soon as signs of dyspnea appear. The details of operation have been given in previous chapter. As large a tube as possible should be used. The accompanying cut (Fig. 78) illustrates the form of tracheotomy tube devised by me for use in cases of carcinoma, or for any cases in which a tube must be worn for a long time. It has advantages over the ordinary tube in that it passes into the trachea a short distance only; does not have to be removed for phonation in cases in which some power of the vocal cords still remains, the finger only being placed over it; is not as irritating to the trachea as those forms of tube are which pass down into the trachea itself; and furnishes a more abundant supply of air. It is of course only adapted for adults and not for cases of emergency tracheotomy, as the length of the tube must be adapted to the individual case.

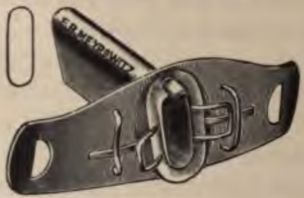

FIG. 78—Author's tracheotomy tube for use in adults when a tube must be worn a long time.

At the present time considerable is being written in regard to the cure of cancer by the use of the X-rays; and it is to be hoped that before many years the present gloomy outlook for the whole class of malignant affections of the upper air tract may give place to a brighter one, and that we may be able to do something more for these cases than to wish for their own sakes that death would come to end their suffering.

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